



सत्यमेव जयते

GOVERNMENT OF RAJASTHAN

Zonal Master Plan

Eco-Sensitive Zone

Nahargarh



Jaipur Development Authority
Forest Department, Govt. of Rajasthan

PREFACE

The key objectives of this study are to create a Zonal Master Plan of Eco-Sensitive Zone of Nahargarh, advise development regulations, and suggest proposals to mitigate negative environmental effects. The Zonal Master Plan of Eco-Sensitive Zone of Nahargarh addresses all the key development issues, including landuse, infrastructure, and transportation, with a primary focus on ecology, environment, and wildlife. The Zonal Master Plan includes a number of studies to analyse the current conditions of various significant tourist destinations, their current situation and infrastructure availability, tourism statistics, environmental issues, and identification of potential tourism sites, as well as the creation of facilities for overall improvement of tourism footfall and tourism sites. The records will make it easier to determine the historical significance and heritage value of potential tourist destinations.

The primary aim of declaring any area as an eco-sensitive zone is to establish a buffer zone or transition zone in order to safeguard the wildlife sanctuary's ecosystem and to enhance both the biotic environment of the sanctuary and the buffer zone surrounding it. As a result, it's important to identify the numerous factors that contribute to environmental deterioration and provide solutions.

The zonal master plan focuses on the biological and environmental issues of the Nahargarh ESZ. In addition, it focuses on an analysis of the present situation in order to comprehend and implement the necessary action to protect and regulate the ecological environment and natural resources of the ESZ region.

The Zonal Master Plan also places a strong emphasis on the potential expansion of ecotourism and prescribes zoning and development control standards in accordance with the Gazetted Notification (dated March 08,2019 by government of India), for sustainable tourist activities and the notification of eco-sensitive zones.



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In order to prepare the zonal master plan, it is important to conduct various surveys and gather data, conduct studies and analyze the information received. In this process various Govt. and Semi- Govt. offices such as JDA, JNN, PCB, Rajasthan, PWD, JVVNL, RIICO, PHED, Forest Dept., Tourism Dept., Archaeology Dept., Dept. of Agriculture etc. and other private institutions have continuously supported us by providing the required data. We thank all those officers and officials who supported us directly or indirectly in formulation of this Zonal Master Plan report.

The data received from primary surveys was gathered from citizens and we also thank them for the same. We hope that this document will act as a guide to improve the environment not only in wild life sanctuary but also of eco sensitive zone and help to promote sustainable tourism. At the end we hope that in future all the stakeholders will help in implementation of Zonal Master Plan of ESZ area.

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List of Abbreviations

ACTP	Addl. Chief Town Planner
ADG	The Additional Director General
BOT	Built, Operate and Transfer
CD	Community Development
CGWB	Central Ground Water Board
CM	The Chief Minister
DO	Dissolved Oxygen
DTP	Deputy Town Planner
EFAs	Ecologically Fragile Areas
EIA	Environmental Impact Assessment
ELU	Existing Landuse
ESZ	Eco Sensitive Zone
FPM	Forest Fire Prevention & Management
GSI	Geological Survey of India
IDF	Intensity duration Frequency
IMD	Indian Meteorological Department
JDA	Jaipur Development Authority
JMC	Jaipur Municipal Corporation
MBGL	Meter below Ground Level
MDP	Master Development Plan
ZDP	Zonal Development Plan
Mg/l	Milligrams per litre
MoEFCC	The Ministry of Environment, Forests and Climate Change
MSL	MEAN SEA LEVEL
NBP	Nahargarh Biological Park
NOC	No Objection Certificate
OCF	Other Community Facility
PCCF	Principal Chief Conservator of forests
PLU	Proposed Landuse
PSP	Public & Semi Public
RF	Reserved Forest
RFO	Range Forest Officer
ROW	Right of Way
RSPCB	Rajasthan State Pollution Control Board
SC	Scheduled Caste
ST	Scheduled Tribe
WFPR	Work Force Participation Ratio
ZMP	Zonal Master Plan
DPCR	Development Promotion and Control Regulations
HHS	Households
DEWATS	Decentralized Wastewater Treatment Systems



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PART-A BASELINE STUDIES & EXISTING SCENARIO



1. INTRODUCTION

1.1 Background

Eco-Sensitive Zones (ESZs), sometimes also known as Ecologically Fragile Areas (EFAs), are areas notified by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India around protected areas, National Parks, and Wildlife Sanctuaries. MoEFCC draws powers from the Environment (Protection) Act, 1986. The vision of declaring ESZs is to create some "shock absorbers" for the protected areas by regulating and managing the activities around such sites. They also act as a transition zone from areas of high protection to areas requiring lesser protection. The MoEFCC came out with new guidelines for regulating such areas in 2011.

Regarding the statutory provisions about ESZs, the MoEFCC functions under the Environment (Protection) Act, 1986, enacted in 1986 under Article 253 of the Indian constitution. The word ESZ exists nowhere there; nevertheless, Section 3(2)(v) of the Act says that Central Government can restrict areas in which any industries, operations or processes, or class of industries, operations, or processes shall not be carried out or shall be carried out subject to certain safeguards. Besides Rule 5(1) of the Environment (Protection) Rules, 1986, which expresses that the central government can prohibit or restrict the location of industries and carrying on certain operations or processes based on considerations like the biological diversity of an area, maximum allowable limits of concentration of pollutants for an area, environmentally compatible landuse, and proximity to protected areas; these aforementioned two clauses have been effectively used by the government to declare ESZs of EFAs as well as areas to declare as "No Development Zone" viewing the aforesaid importance. The criteria set by the committee constituted by the MoEFCC set the guidelines from time to time and revise them as per the need.

Currently, typical guidelines to declare an ESZ or EFA are such as species-based (endemism, rarity, etc.), ecosystem-based (sacred groves, frontier forests, etc.), and geomorphologic feature-based (uninhabited islands, origins of rivers, etc.). Major endeavors have been taken place so far concerning the imperatives parameters, which have been adopted by the MoEFCC to declare the ESZ as given below.



- a. Wildlife Conservation Strategy was adopted in January 2002 in the meeting of the National Board for Wildlife, wherein it was envisaged that "lands falling within 10 kilometers (km) of the boundaries of National Parks and Sanctuaries should be notified as eco-fragile zones" under Section 3(v) of the Environment (Protection) Act, 1986 and Rule 5 of the Environment Protection Rules, 1986.
- b. Request by the Additional Director General (ADG) of Forests (February 2002) to all the Chief Wildlife Wardens for listing such areas within 10 km of the boundaries of the National Parks and Sanctuaries and furnish detailed proposals for their notification as ESZ areas under the above-mentioned Act.
- c. The National Wildlife Action Plan (2002-2016) indicates, "Areas outside the protected area network are often vital ecological corridor links and must be protected to prevent isolation of fragments of biodiversity which will not survive in the long run".
- d. The intervention of the Supreme Court in December 2006 in favor of MoEFCC, thereafter, a committee was organized by MoEFCC for identifying parameters for designating ESZs in India.
- e. The identified parameters were richness of flora and fauna, slope, rarity and endemism of species in the area, origins of rivers, etc.

It is also imperative to note that the Directive Principles of State Policy, Article 48 provisioned about the endeavor of every state to protect and improve the environment and to safeguard the forests and wildlife of the nation; moreover, Article 51-A states that "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures".

1.2 Extent & Boundaries of Nahargarh Wildlife Sanctuary, and ESZ

As stated earlier, Nahargarh ESZ is named after the prominent sanctuary of Nahargarh. The ESZ has been demarcated up to an extent of 0 (zero) to 13 kilometers around the boundary of Nahargarh Wildlife Sanctuary and the area of the ESZ is 79.35 sq. km. Zero extents in the boundary are towards the sides with heavy urbanization. The extent of boundaries for the ESZ and Wildlife Sanctuary is presented in Figure 1.1 (see Gazette Notification of 8th March, 2019) which shows the Nahargarh Wildlife Sanctuary and ESZ as per Gazette Notification, 2019. Based on Fig. 1-1 from the respective Gazette



Notification, Fig. 1-2 was prepared by the consultant, which shows the boundaries of Nahargarh Wildlife Sanctuary, and Nahargarh ESZ.

The Nahargarh Wildlife Sanctuary is the prominent feature of this ESZ, and the Sanctuary lies between latitudes 26°56'15.08"N and 26°57'5.81"N and longitudes 75°48'55.70"E and 75°46'54.65"E. The Sanctuary was notified by the Government of Rajasthan in 1980 (vide notification No. F11 (39) Revenue/8/80 dated the 22nd September 1980), and it is situated in the Aravalli ranges at Amber hills, Jaipur district of Rajasthan. The sanctuary is spread over an area of 52.40 sq. km, enclosing the famous Nahargarh fort, on the Jaipur-Delhi highway.

The tract of Nahargarh Wildlife Sanctuary is hilly, having undulating ground and numerous narrow valleys as given below;

- Amer Valley
- Odhi Ramsagar Valley,
- Gurjar Ghati and,
- Charan Mandir Valley

The plateau near Nahargarh Fort is well defined. Altitude varies from 400 meters to 648 meters height above mean sea level (msl).



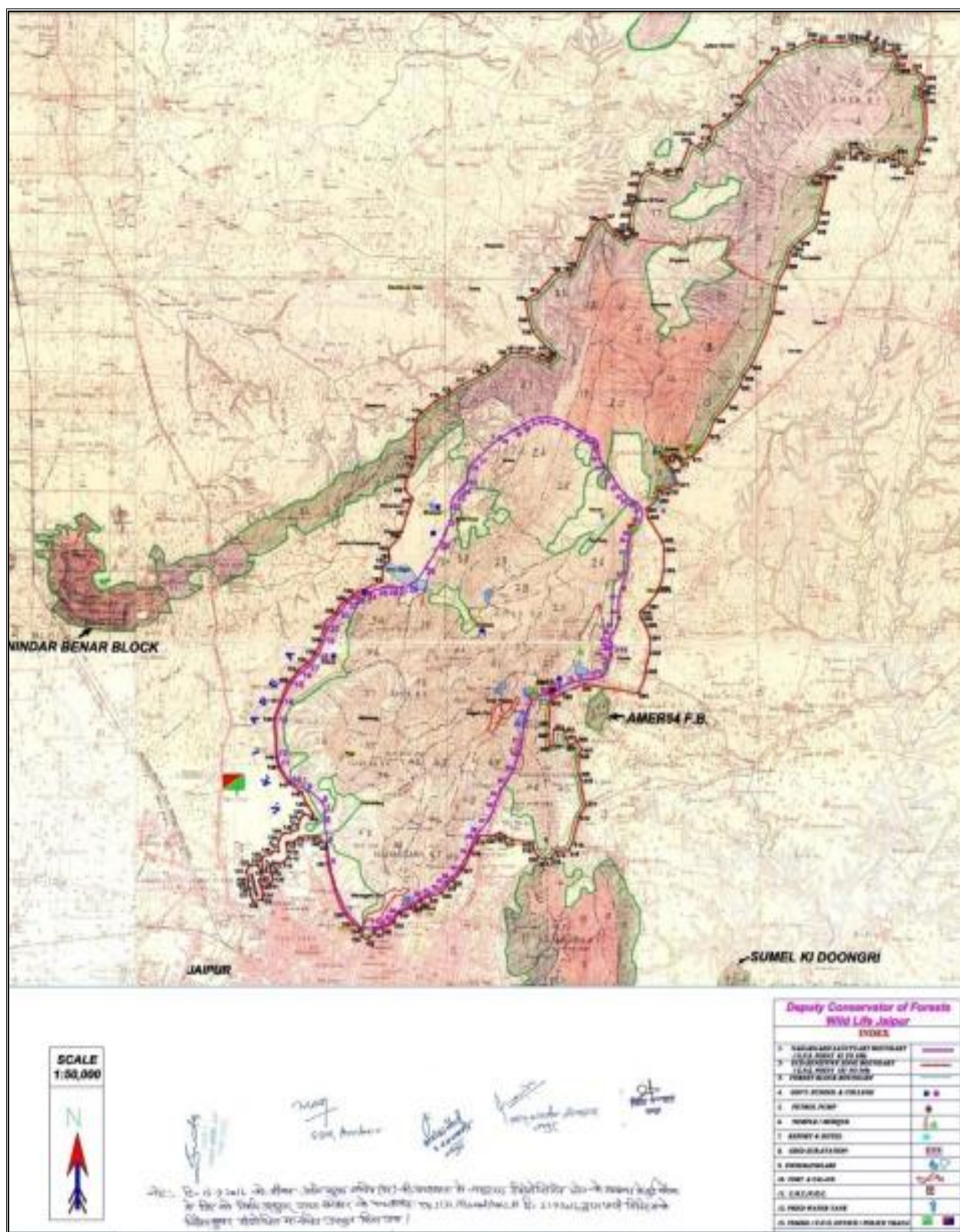


Figure No.: 1.1 Nahargarh Wildlife Sanctuary and ESZ as per Gazette Notification, 2019

Source: Gazette Notification, New Delhi (2019) and DCF, Jaipur (2019).



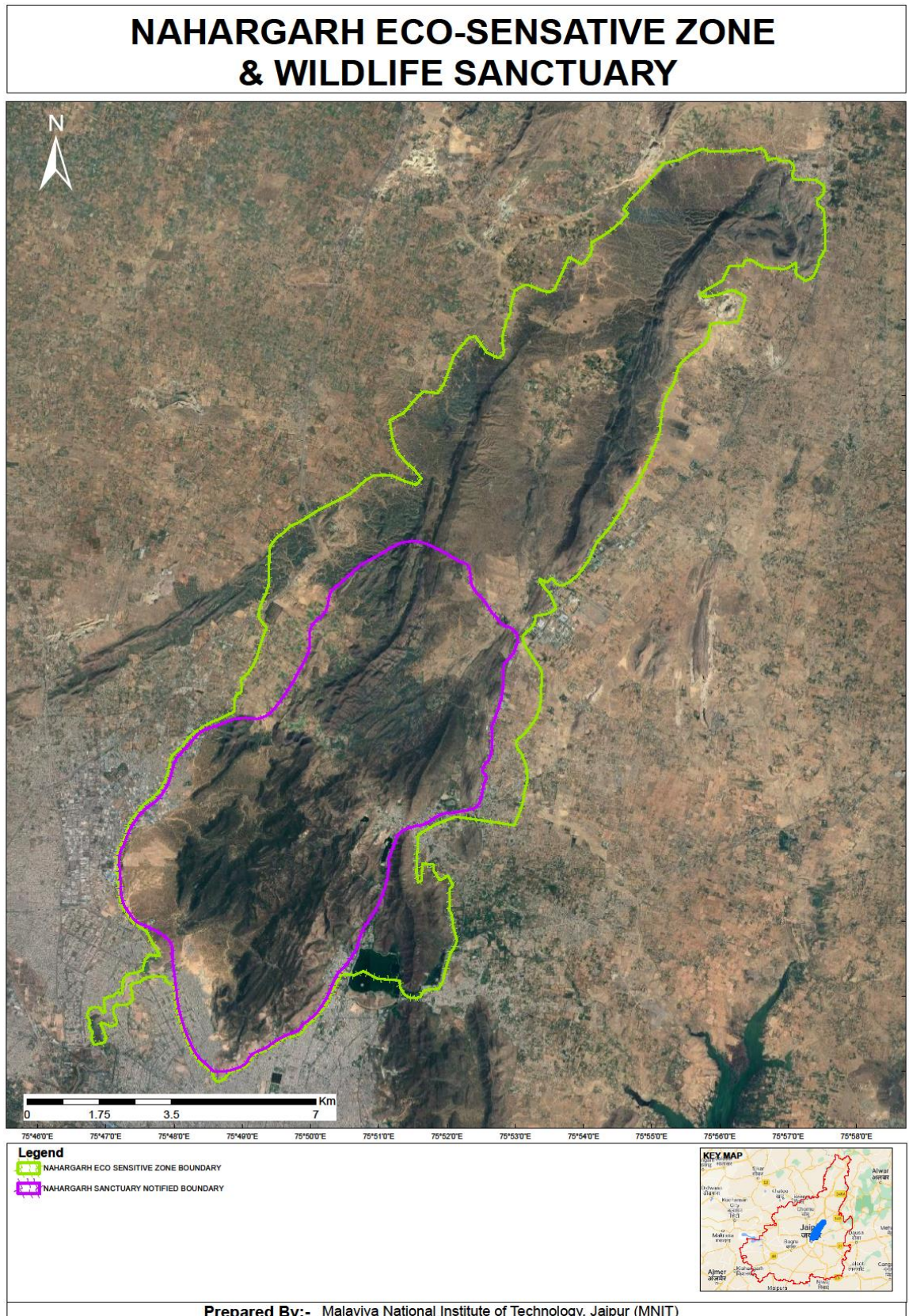


Figure No.: 1.2 Nahargarh Wildlife Sanctuary and ESZ Boundary

Source: Prepared based on Gazette Notification, 2019

Nahargarh Sanctuary has been divided into two ranges, i.e. Nahargarh and Amer ranges. The boundary of Nahargarh Wildlife Sanctuary is described as under:

A. Northern Boundary

Forest area Beer Talera, forest area of village Kukas up to Northern boundary of village Khurad, adjoining forest area of village Daulatpura Khasra Nos. 1090 & 1091 and Northern part of Khasra Nos. 4, 5, 6 & 7 of village Kukas.

B. Eastern Boundary

Forest line adjoining revenue area of village Kukas, Khurad, Chimanpura, Amer and habitation of Amer, Maotha, Amer-Delhi road, revenue area of village Nahargarh.

C. Southern Boundary

Adjoining forest boundary to abadi Brahmpuri, and Purani basti

D. Western Boundary

Habitation of Nahri-Ka-Naka, revenue area of village Kishanbagh, Bir Papad, VKI West to Amanishah Nala' forest line adjoining revenue area of village Jaishlya, Akera, Shisyawas, Badagaon Bhatia, North-Western part of Khasra Nos. 82 & 83 of village Mandya and adjoining forest area to khasra Nos. 1092-93 of village Daulatpura.

The boundary of Wildlife and ESZ area map is as below (Figure 1.3).



a

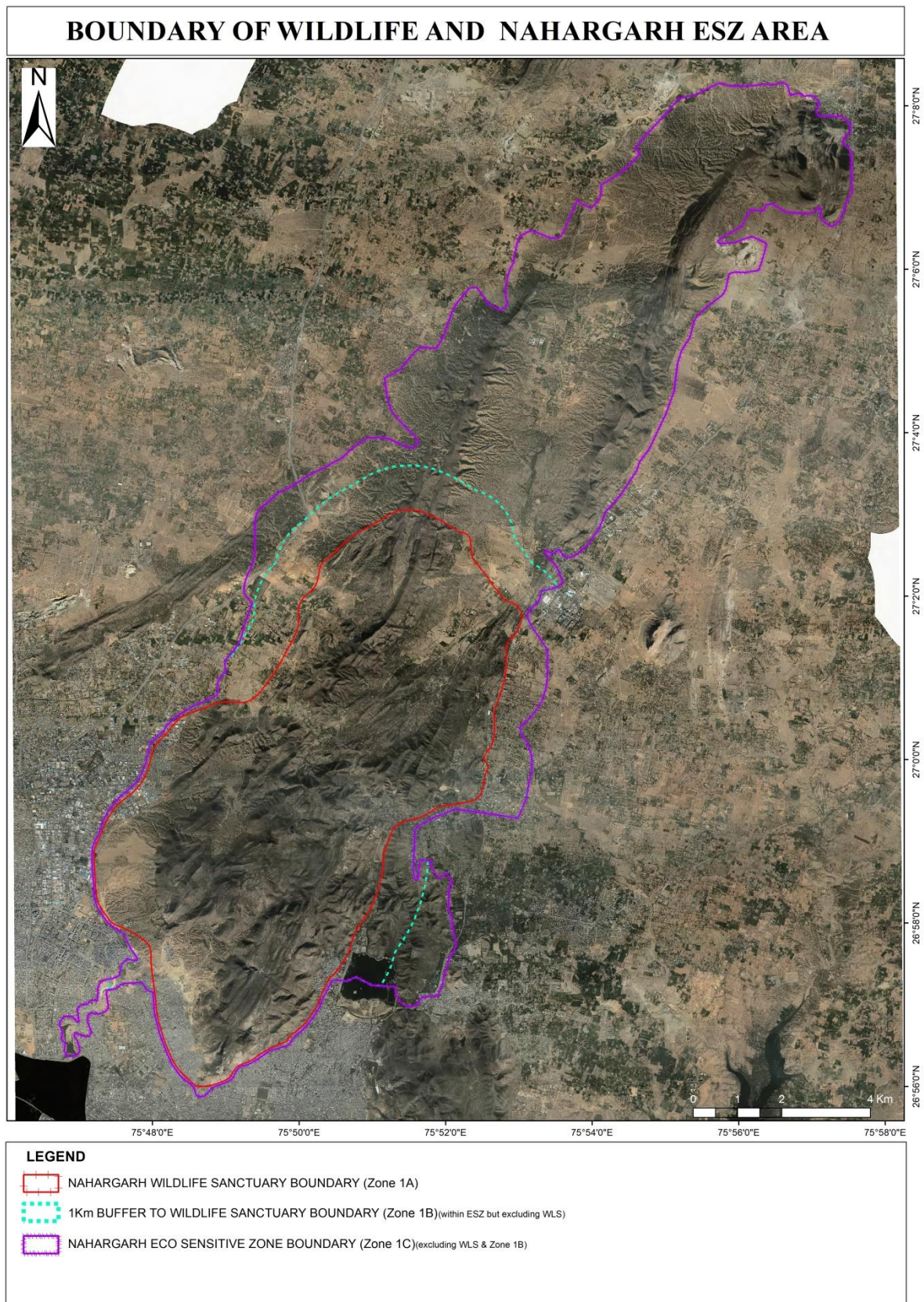


Figure No.: 1.3 Boundary of WLS and ESZ, Nahargarh



Keeping given the richness of flora and fauna, heritage importance, tourist perspectives, and environmental importance, MoEFCC uses the powers given under the Environmental Protection Act, 1986, in the exercise of Sub-section (1) and Clauses (v) and (xiv) of Sub-section (2) and Sub-section (3) of Section 3 (hereafter in this notification referred to as the Environment Act) read with Sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986, notified an area to an extent of 0 (zero) to 13 kilometers around the boundary of Nahargarh Wildlife Sanctuary, in Jaipur district of Rajasthan as ESZ. Coming to the boundaries of the said ESZ is as below:

a. Northern boundary

The extent of ESZ from marked on reserve forest block boundary Amer-54 and ESZ boundary including villages Bagwara, Singwana, Chhapradi, Jaitpura Khinchi, Achrol, Ani, Labana, Gunawata, Dhandh, Harbar to Kukas up to 13 kilometers buffer. Above said Northern boundary of ESZ is co-terminus with the boundary of reserve forest block Amer-54 and will include the whole reserve forest in the ESZ.

b. Eastern boundary

The ESZ's perimeter starts at the Reserve Forest Block line and extends along National Highway No. 8 (now NH-11-C), between 100 and 500 metres from the Sanctuary boundary.

Similarly, the boundary along NH-8 (Now 11 C) will be an ESZ, including Rajamal ka Talab. The extent of the ESZ in this direction will be from 100 meters to 2.0 km.

c. Southern boundary

ESZ boundary will be co-terminus with the boundary of Sanctuary, co-terminus with the boundary of Reserve Forest Block Amer -54 likewise, and it will run along the natural boundary (flow as well as bed area up to both banks) of Amanishah Nallah.

d. Western boundary

In the West direction, the boundary will be co-terminus with the boundary of Sanctuary, having a buffer of 50 meters to 2 km including Bahav Sagar, Akhepura, Badagaov, Bhatiya, and Bishangarh Areas.

1.2.1 Area & Extent of Nahargarh ESZ including Wildlife Sanctuary

A map has been prepared based on Satellite imagery using prominent locations mentioned in ESZ Notification dated 08-03-2019.



1.3 Villages under ESZ, Nahargarh

Nahargarh Eco-Sensitive Zone comprises various villages within its boundary. As per Gazette Notification of MoECC dated 8th March 2019, there are total 26 villages falling in the limit of Nahargarh ESZ. Out of total 26 villages 13 villages fall under Nahargarh Wildlife Sanctuary whereas remaining 13 villages are in rest of the ESZ area. As per notification villages falling under ESZ are listed below:

Table: 1.1 List of Villages falling under ESZ (As per notification)

S. No.	Villages within Sanctuary Boundary	S. No.	Villages in Eco-Sensitive Zone
1	Nahargarh	1	Kukas
2	Amer	2	Harwar
3	Chimanpura @ Daab Ka Nala	3	Dhand
4	Kukas	4	Gunawata
5	Nestiwas	5	Labana
6	Khurad	6	Ani
7	Taleda	7	Achrol
8	Badagaon Jarkhya	8	Jaipur Khinchi
9	Sisiyawas	9	Chhaprari
10	Akeda	10	Singhwana
11	Jaisalya	11	Chokhalyawas urf Kacherawala
12	Papad	12	Bagwada
13	Kishanbagh	13	Daulatpura

As per the above table village Kukas is mentioned in Sanctuary boundary as well as in Eco-Sensitive Zone, the reason being Kukas village is at the boundary of Wildlife Sanctuary and shares its area in both the zones.

When the ESZ boundary as per the geo-coordinates was superimposed on GIS map then it was found that nine villages are falling completely or partially within ESZ area. List of these villages is as under.

Table: 1.2 List of additional villages falling within ESZ apart from gazette notification

S. No.	Villages within Sanctuary Boundary	S. No.	Villages within Sanctuary Boundary
1	Kotra	6	Akhepura
2	Dheengpura	7	Nangal Susawatan
3	Kherwari	8	Vijay Mahal
4	Bishangarh	9	Manpur Sadwa
5	Mailabagh		



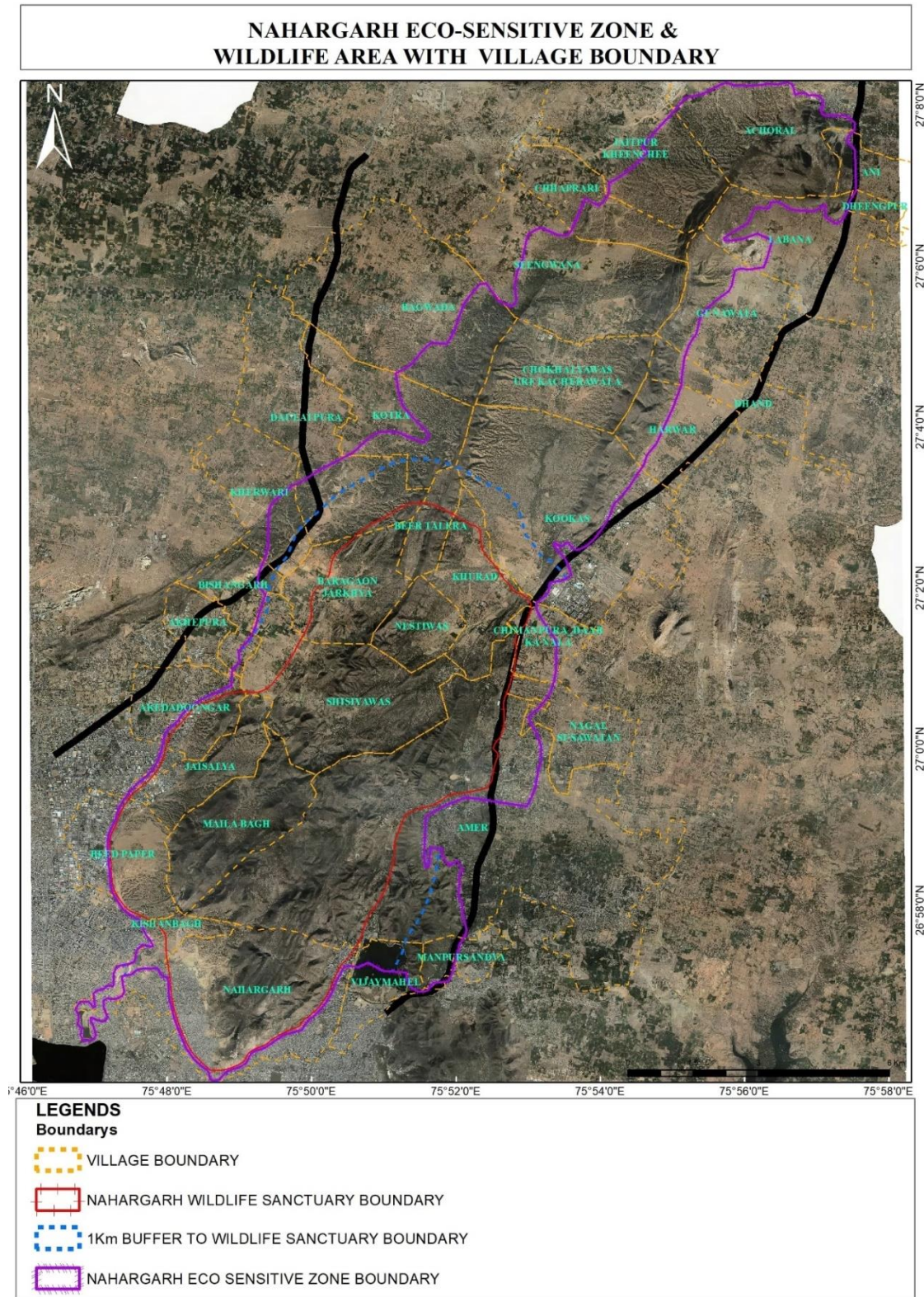


Figure No.: 1.4 Nahargarh Eco-sensitive Zone and Wildlife area with village boundary

1.4 Vision and Objectives of ZMP for Nahargarh ESZ

Vision of preparation of Zonal Master Plan for Nahargarh ESZ is to ensure sustainable development in considering the environment of the area. The ZMP document is framed to focus on the preservation of ecology and environment, and the conservation of biodiversity by restricting the unnecessary developments.

Objective of Eco-Sensitive Zone Master Plan of Nahargarh is as under:

- A. To prevent the development activities those are detrimental to ecology within ESZ Area.
- B. To conserve, preserve and protect the natural heritage and biodiversity of ESZ such as forest, wildlife, flora & fauna. Identify the vulnerable species in terms of flora and fauna, and suggest necessary actions to conserve the natural heritage.
- C. To prepare detailed proposals to regulate, control, and promote the permissible activities only to maintain its ecological and environmental balance.
- D. To identify heritage assets (natural & manmade heritage) such as monuments, historically important monuments and structures, water bodies, other natural features, etc.
- E. To identify areas for promotion of eco-tourism, for up-liftment of local communities.
- F. To prepare a Tourism & Eco-Tourism Master Plan for the planning area.
- G. Suggestions for Management & Governance of Eco-Sensitive Zone Area.

1.5 Study Methodology

The conservation of Nahargarh Wildlife Sanctuary, the buffer area around it including the notified ecological zone is of prime importance for the protection of flora and fauna and overall biotic environment. These aspects have been stressed in Eco-Sensitive Zone notifications and various guidelines issued in this regard by the Central Govt. from time to time. The stages of work and studies have been listed below to achieve the required objectives. The study would also give due emphasis to the relevant policy guidelines and Central Govt. laws including court judgements if any. Due to importance of ecological and environmental concerns duly given in the Gazette Notification (8th March 2019) by the Ministry of Environment, Forest and Climate Change (MoEFCC) for the declaration and aspects of ZMP preparation for the Nahargarh ESZ, it is necessary to study the present status and identify various issues concerning degradation of environment.



The methods of study would also give due emphasis to the relevant Central and State laws and the guidelines issued by the Central Government if any in this regard.

a. Preparation of Geo-Referenced Base Maps

Based upon the existing maps or revenue maps available with the government authorities, surveys were conducted and ground truthing was done. MNIT Jaipur has prepared geo-referenced maps required for the preparation of ZMP for the Nahargarh ESZ. Base Map attached as Annexure-1.

b. Field Surveys and Data Collection

Field surveys have been conducted to collect necessary data for assessing issues and problems as well as understand the resource potentials for the development of the ZMP for Nahargarh ESZ. The surveys particularly focus on aspects like heritage, tourism, ecology, urban activities in the vicinity, and environmental concerns. All the existing worshiping places, villages, urban settlements, types, and kinds of forests, soil types, agricultural areas, horticultural areas, orchards, lakes, and other water bodies have been marked on the map. The existing and proposed landuse features have been analyzed. Field surveys have been conducted to understand major transportation and communication networks, infrastructure facilities, heritage and tourism, and environmental impacts.

Detailed secondary data collection and field surveys have been conducted on the following aspects to identify present issues, condition assessment, and growth trends in the area.

- i. Existing landuse survey for the ESZ area.
- ii. Natural water bodies and water pollution
- iii. Tourism and Eco-tourism
- iv. Natural heritage sites
- v. Man-made heritage sites (Buildings, structures, and precincts of historical, architectural, aesthetic, and cultural significance
- vi. Noise pollution
- vii. Air pollution
- viii. Surveys for physical infrastructure including water, power, sewerage system, other sanitation issues, etc.



- ix. Study of a disposal system for solid waste management (SWM) including medical wastes, etc.
- x. Transportation issues and suggesting plans for strengthening of Transportation network, Parking, Public transport, etc.
- xi. Industries in the immediate vicinity that may cause pollution, mining activities (if any)
- xii. Collection of secondary information from the Census of India, G.T. Sheets, and other line departments

c. Data Analysis and preparation of landuse maps

Base map has been updated to prepare the existing landuse map for the planning area. All the above-mentioned data collected from primary or secondary sources have been compiled and analyzed to identify trends, potentials, and problems in the planning area concerning the conservation and protection of ecology, and biodiversity. The analysis was followed by projections on aspects like demography, landuses, socio-economic conditions, basic traffic and transportation requirements, and community facilities.

d. Physical development proposals

It enshrines the below-given aspects of developments:

- i. A plan has been made for indicating planned uses as per the Master Development Plan of JDA and uses permitted hereafter to comply with the ESZ guidelines. (Nahargarh ESZ notification dated 8th March 2019 by MoEFCC).
- ii. Plans for balanced development with specific emphasis on tourism, heritage, and ecology have been prepared. The promotion of biodiversity was the focal point and to achieve this, proposals have been prepared and given for improvement of conditions of water bodies, forest areas, retention of water, and soil conservation, in the Nahargarh ESZ.

e. Submission of Draft Zonal Master Plan for Nahargarh ESZ

The draft ZMP for Nahargarh has been prepared. This would be submitted to the Deputy Conservator of Forest (DCF-WL), Jaipur that in turn may be sent to various line departments for their comments. In addition to this, public objections and suggestions would be invited for a stipulated period once the draft plan is approved by the concerned



departments. A brief report shall be prepared to describe suggestions received in brief and comments thereon.

f. Submission of Final Zonal Master Plan for Nahargarh ESZ

The Final said Plan should be prepared and submitted to the client after incorporating suggestions received from the public and line departments.

g. Methodology:

The study methodology has been prepared which clearly spelt out the steps required for preparation of Zonal Master Plan for Nahargarh ESZ which is given below:

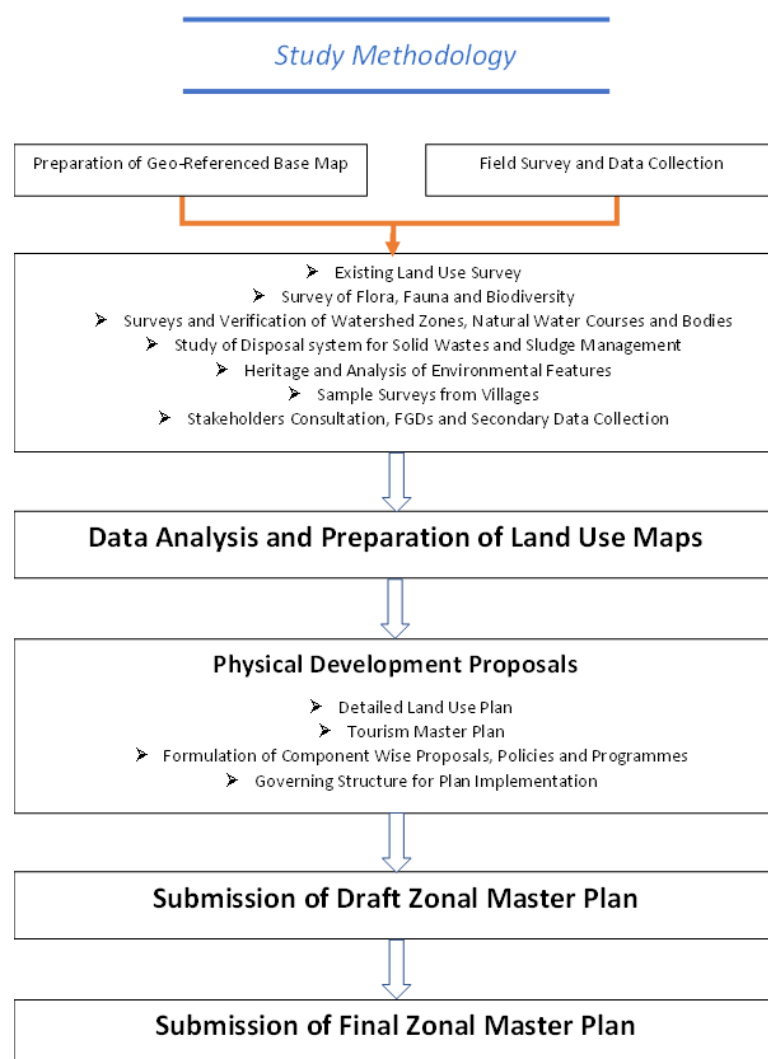


Figure No.: 1.5 Study Methodology

1.5.1 Jaipur District

As of now, Rajasthan state has 33 districts, which have been divided into 7 divisions viz. Ajmer, Bharatpur, Bikaner, Jaipur, Jodhpur, Kota and Udaipur divisions. Each division consists of 4-6 districts. Nahargarh Wildlife Sanctuary and Nahargarh ESZ fall

under the jurisdiction of Jaipur districts and Amer Tehsil. The district Jaipur falls in the North-East direction in the state of Rajasthan. It is bordered on the West by Nagaur district, on North by Sikar district, on East by Dausa district, and on the South by Tonk district. Being one out of seven divisional headquarters, it is comprising consists of the following districts in its divisional jurisdictions:

- 1) Alwar
- 2) Dausa
- 3) Jaipur
- 4) Jhunjhunu
- 5) Sikar

The district Jaipur has a geographical area of 11,152 sq. km and population of 6,626,178 People (Census 2011). The district has population density of 594 person/sq. km. being a district headquarters, Jaipur consists of 13 Tehsils. Moreover, the Nahargarh ESZ comprises of 26 revenue villages in which 13 villages are under Nahargarh Wildlife Sanctuary, and 13 are under Nahargarh ESZ (Gazette of 8th March 2019).

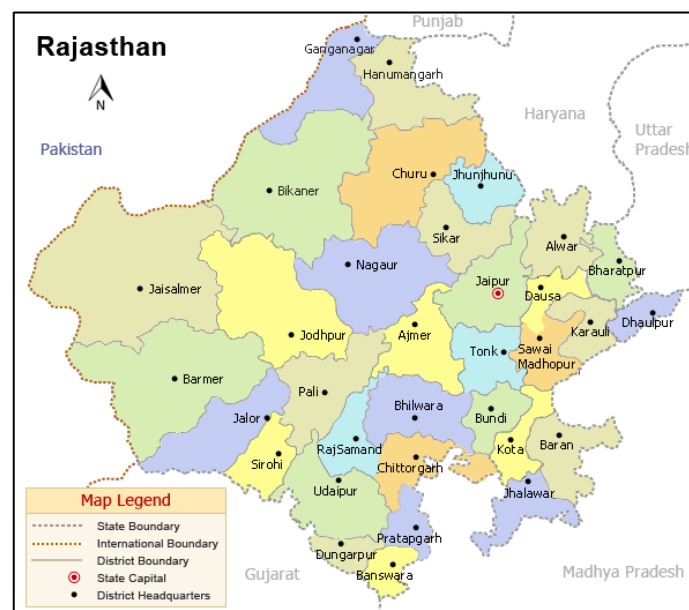


Figure No.: 1.6 Districts of Rajasthan-2022

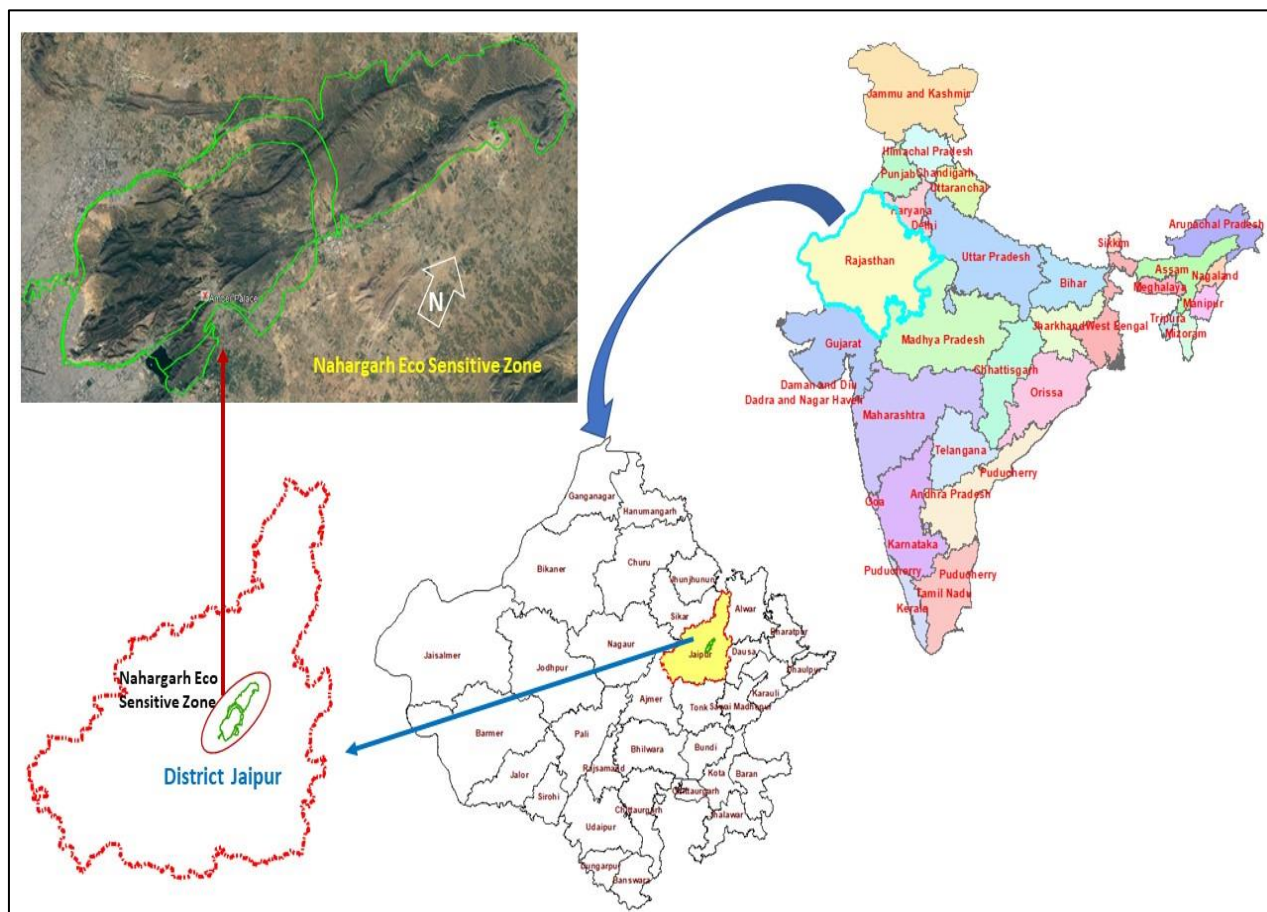


Figure No.: 1.7 Regional Setting of Nahargarh ESZ, 2022

1.5.2 Eco-Sensitive Zone Location and Area

As said earlier, Nahargarh ESZ is named after the prominent sanctuary of Nahargarh. The Eco-Sensitive Zone has a total area of 79.356 sq. km. The Nahargarh Wildlife Sanctuary is the prominent feature of Nahargarh ESZ, and the Sanctuary lies between latitudes 26°56'15.08"N and 26°57'5.81"N and longitudes 75°48'55.70"E and 75°46'54.65"E. The sanctuary is spread over an area of 52.40 sq. km, enclosing the famous Nahargarh fort, on the Jaipur-Delhi highway (Vide 2.4).

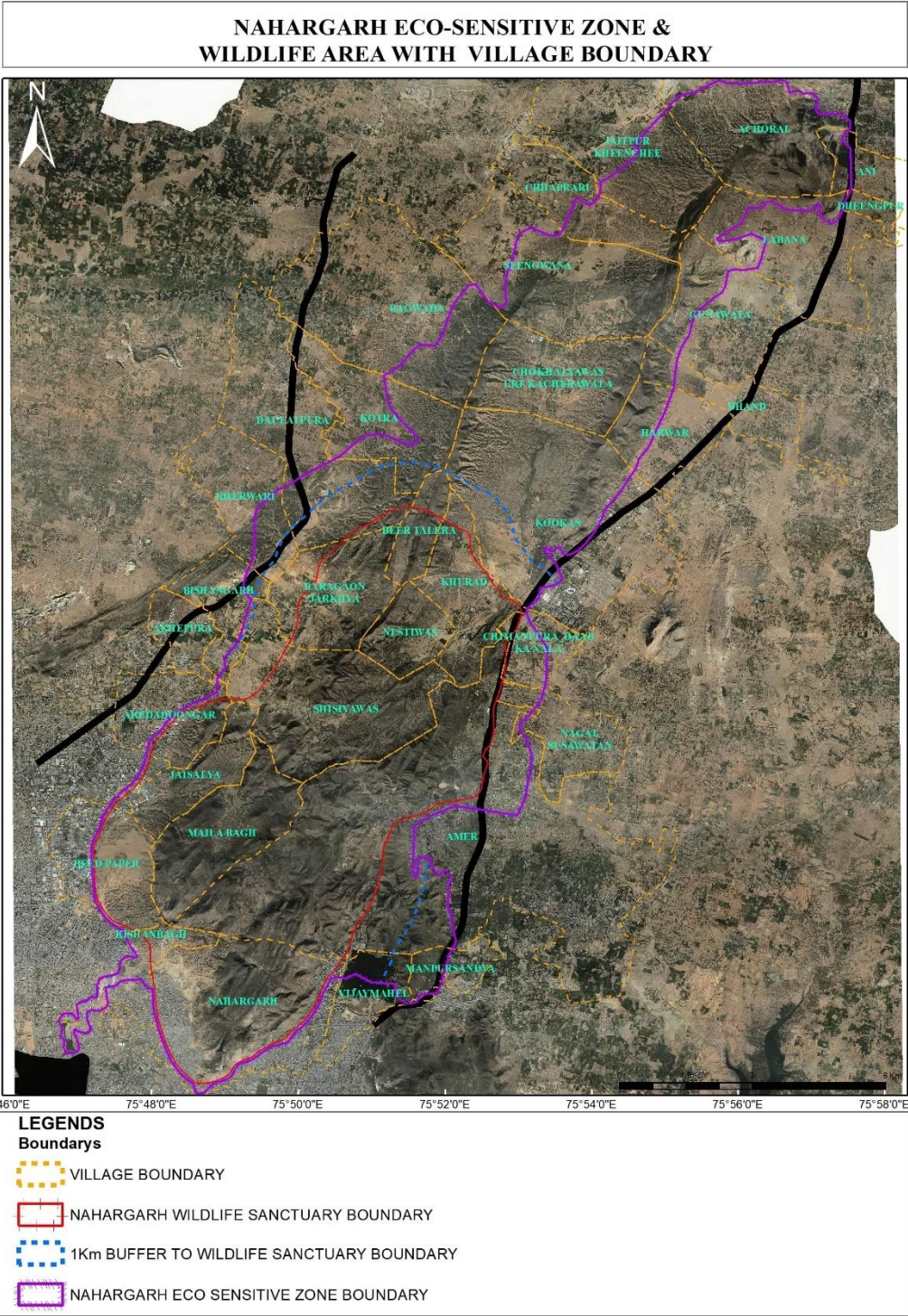


Figure No.: 1.8 Super-Imposition of Village Boundary on ESZ

1.5.3 Linkages

Nahargarh Sanctuary can be easily approached from earlier National Highway-08 i.e. road between Jaipur and Delhi. The bypass of NH-8 falls on the Eastern edge of the Sanctuary, which connects the Sanctuary to Delhi and Ajmer. The Sanctuary is approachable from Jaipur-Amer Road, which links Nahargarh fort from Kala Mahadeo

area. It is also approachable from Amer fort, Akera, Nahri-Ka-Naka and a few outlets from Mungana area through low passes.

Nahargarh Sanctuary is 254 km away from National Capital New Delhi on NH-48. Town, Sikar falls 108 km away on NH-52, and Ajmer is located at 148 km; connected through NH-48. Dausa, in the East direction, falls 63 km on NH-21 (Figure 1.10).

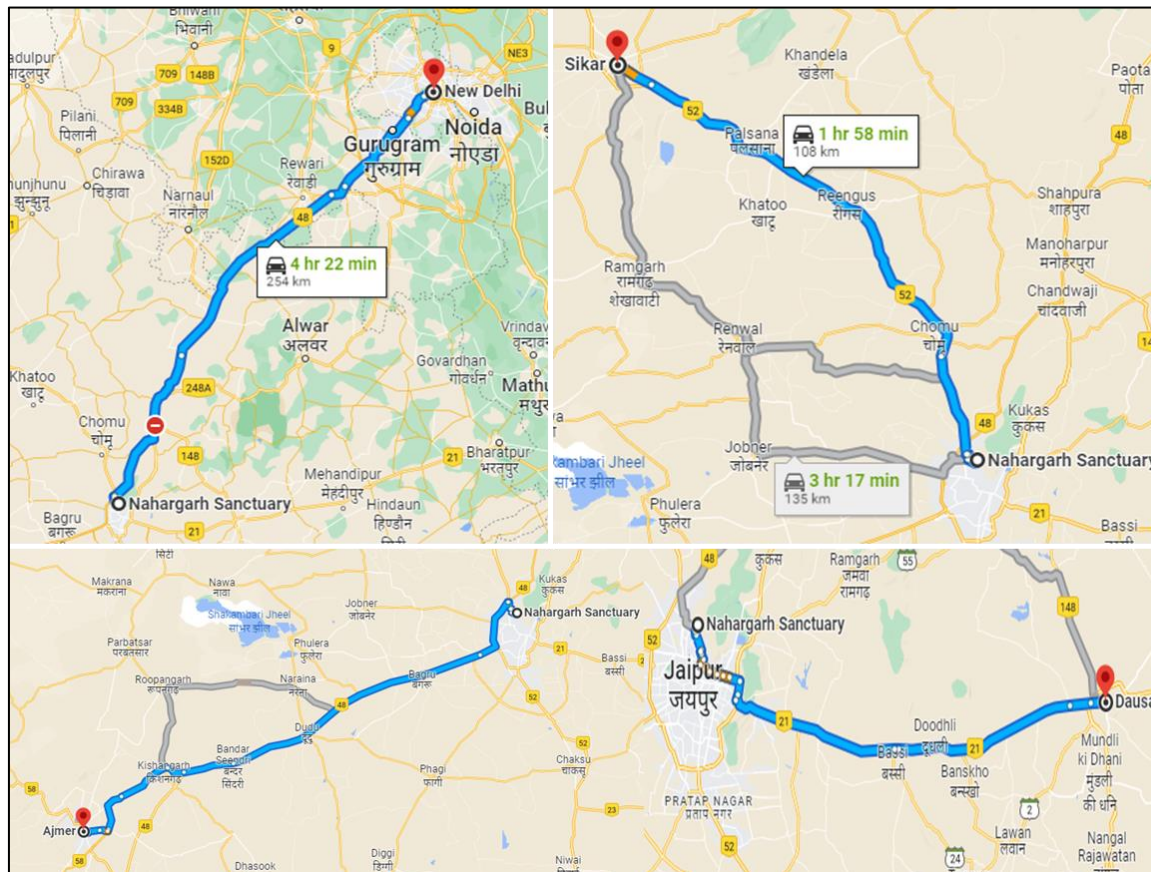


Figure No.: 1.9 Road Linkages

1.6 Location and Natural Setting

Nahargarh ESZ falls under the Biogeographic Zone-4 of India. Nahargarh Wildlife Sanctuary is the prominent identity of the Nahargarh ESZ. Nahargarh Wildlife Sanctuary is located in Tehsil Amber (Amer), which comes under Nahargarh ESZ, and it is situated in North-Eastern part of Aravalli Hills and Northern outskirts of Jaipur city (Rajasthan). The Sanctuary is at a distance of 3 km from Amer town on Delhi highway. Deciduous Forest covering hills is a home for wild life of this sanctuary. A part of this sanctuary was developed as a Biological Park in 1993, which known as Nahargarh Biological Park with the sole objectives of Wild Life Conservation, Wildlife Education and Research.

The ESZ is situated approximately 1,400 meters above from msl. The ESZ lies between 26° 55'56.655" N to 27° 8'20.771" N latitude, and 75° 46'48.630" E to 75° 57'39.966" E longitudes. Coming to the geographical location of the Sanctuary, it is confined between latitudes 26°56'15.08" N and 26°57'5.81" N and longitudes 75°48'55.70" E and 75°46'54.65" E. The Aravalli Ranges (oldest hills of India) traverse through the Sanctuary and the forest type is a subsidiary edaphic type of dry tropical thorn forest (Lawania & Trigunayat, 2015).

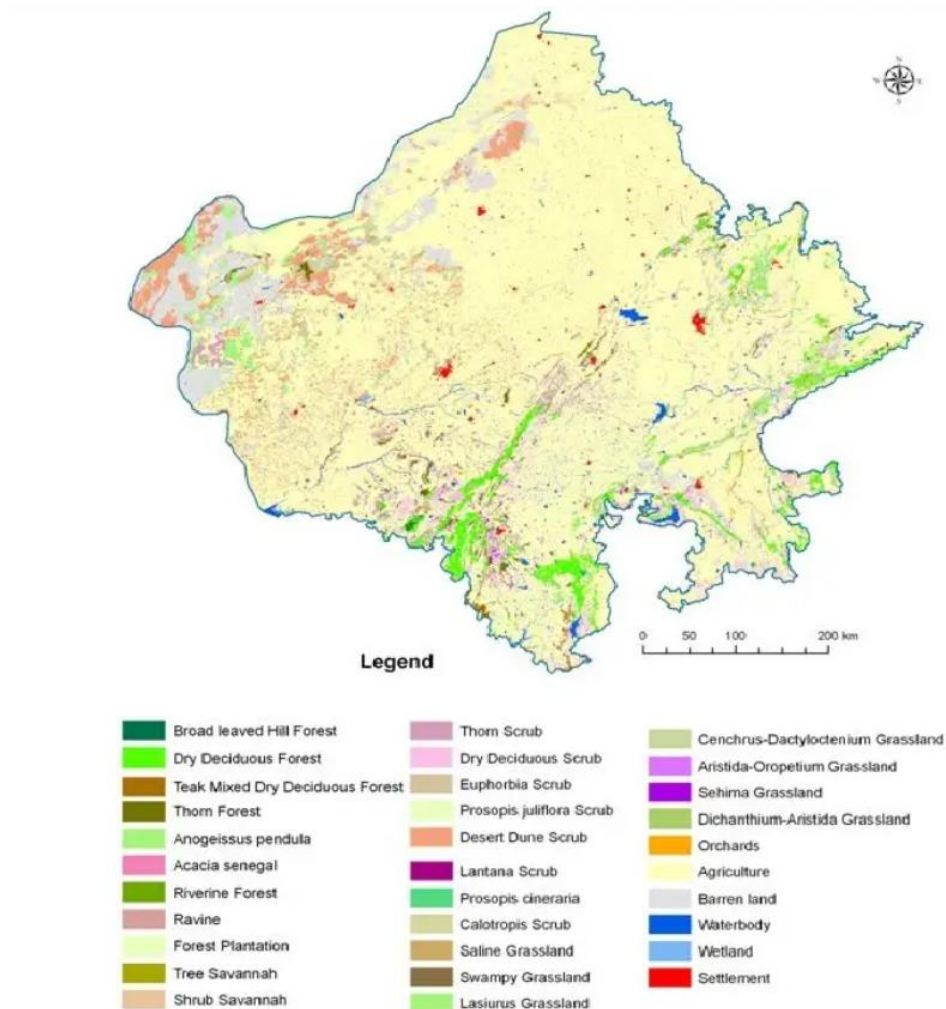


Figure No.: 1.10 Vegetation type and landuse map of Rajasthan

Source: Mapping the Vegetation Types of Rajasthan, India Using Remote Sensing Data by C. Sudhakar

Reddy*, P. Hari Krishna and A. Ravi Kiran

2. NATURAL FEATURES

2.1 Introduction

Natural features refer to physical elements or characteristics that are formed by natural processes and exist in the environment. They can include various landforms, bodies of water, vegetation types, and other geological or ecological elements. Natural features in an Ecologically Sensitive Zone can include various elements that are important for the preservation and functioning of the ecosystem. Here are some examples of natural features commonly found in Nahargarh Eco-Sensitive Zones:

2.2 Forest & Environment

In exercise of powers conferred by Section 64 of the Wildlife (Protection) Act, 1972, the Government of Rajasthan has made the Wildlife (Protection) (Rajasthan) Rules, 1977 as published in the Rajasthan Gazette of July 7, 1977. Animals were classified under five schedules to the Wildlife (Protection) Act, 1972. The list of schedules was first amended under No. J. 11012/31776 was notified on September 3, 1977, and October 5, 1977. After that, various schedules to the Wildlife (Protection) Act, 1973, were further amended under Notification No. 1-28/78.

2.2.1 Broad Classification of Forest in Rajasthan

The Forest of Rajasthan is classified into five types:

- Tropical Thorn Forest,
- Tropical Dry Deciduous Forest
- Bamboo- Forest
- Central India Sub-tropical hill forest.
- Mixed Miscellaneous Forest

2.2.2 Category of Forest

Rajasthan has two types of forests: Dry Deciduous Forest and Dry Tropical Forests.

The Eastern region of Rajasthan has a "Tropical Dry Deciduous Forest", whereas the Western region has a "Tropical Thorn Forest.". Under the broad category, the Nahargarh-Amer Forest Range has forests which are "Dry Tropical Forests" (According to the classification of forest types of India by H.G. Champion and S.K. Seth).



2.2.3 Type & Quality of Forest in Nahargarh ESZ

Nahargarh-Amer Forest Range is scattered over a large area on various geological and soil formations and varies significantly in composition and quality. Edaphic and biotic factors determine their distribution. Good forest growth occurs in valleys where better soil and moisture conditions exist. The tree's main species, which covers over 80 percent of the area, is Dhok (*Anogeissus pendula*). Its associates like Salar (*Boswellia serrata*) and Gurjan (*Linnea coromandelica*), grow on rocks and dry regions.

The trees are generally slow growing and attain poor height. The height of trees varies from 4.5 meters to 7.5 meters. In favorable localities, a height of up to 12 meters is achieved. Imli (*Tamarindus indica*), Aam (*Mangifera indica*), Jamun (*Syzygium cumini*), Tendu (*Diospyros melanoxylon*), Churel (*Holoptelea integrifolia*), Siris (*Albizia lebbeck*), *Ficus* spp etc., Which grow in moist localities and attain a large size, both in crown spread and height. Where valleys fall out in the open and where there is nallas Kalam (*Mitragyna parvifolia*) grows gregariously.

These forests have been classified based on their composition as follows;

- (i) Dhok forest
- (ii) Salar forest
- (iii) Miscellaneous forest

Quality of Forest Cover

The Forest cover has been classified into 3 categories, namely; Good, Fair & Bad category. The categorization has been based on following:

1. **Good:** Forest has good tree cover and it is seen where the slopes are gentle, soil cover is available and human intervention is least.
2. **Fair:** Forest having somewhat sparse vegetation and such areas have steeper slopes, moderate soil cover and the soil moisture is less.
3. **Bad:** These areas have extremely sparse bush type vegetation of even total absence of vegetation. These areas are characterized by stony West lands where soil cover is poor and also characterized by maximum human intervention like grazing, cutting of trees etc. In these areas it is possible to have good afforestation where appropriate soil cover is available provided human intervention is stopped. The areas having stony West land cover and land having steep slopes cannot be easily afforested.



Quality of forest has been generated by the study of satellite imageries of different periods as shown in Figure 2.1.

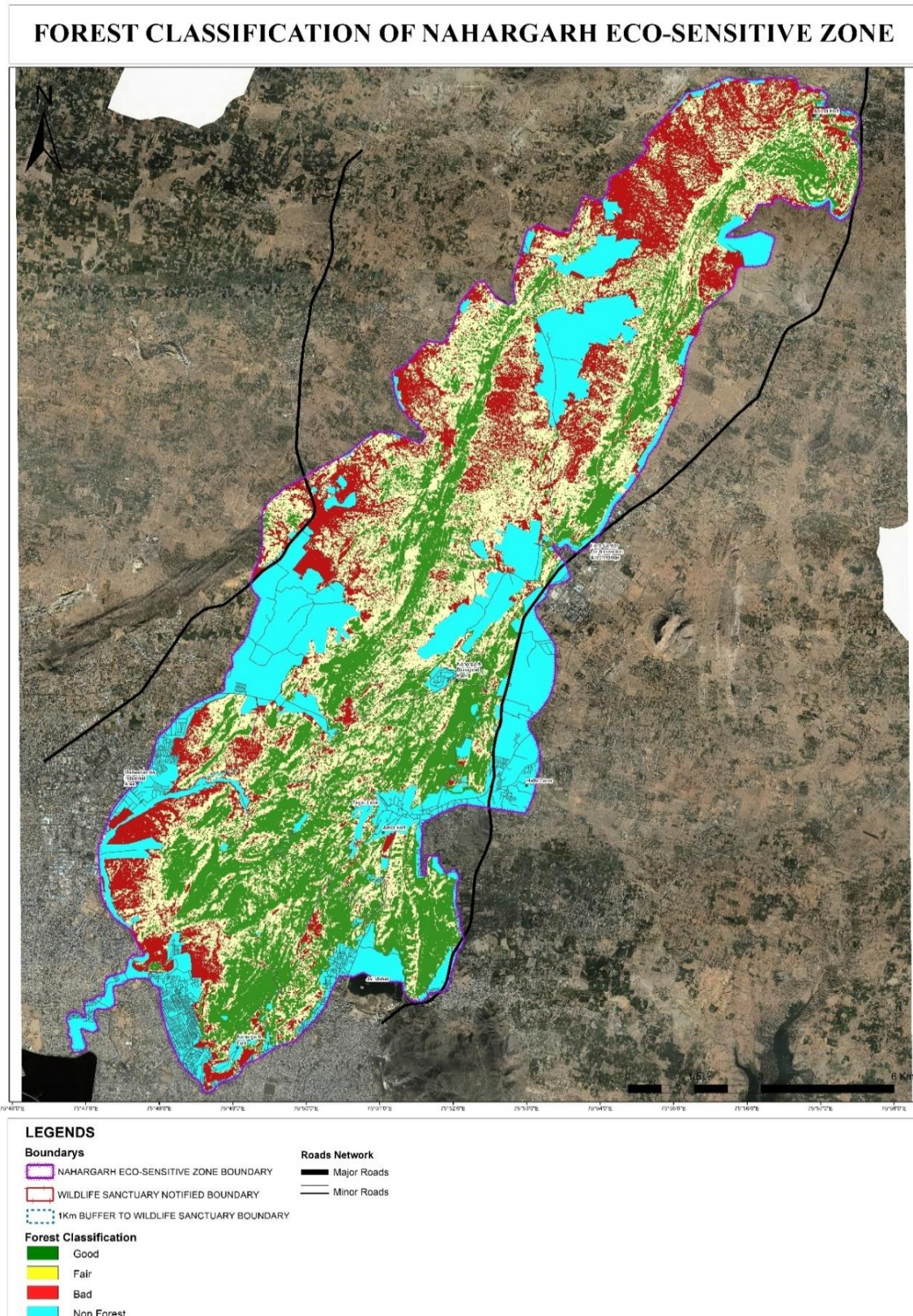


Figure No.: 2.1 Forest Classification Map of Nahargarh

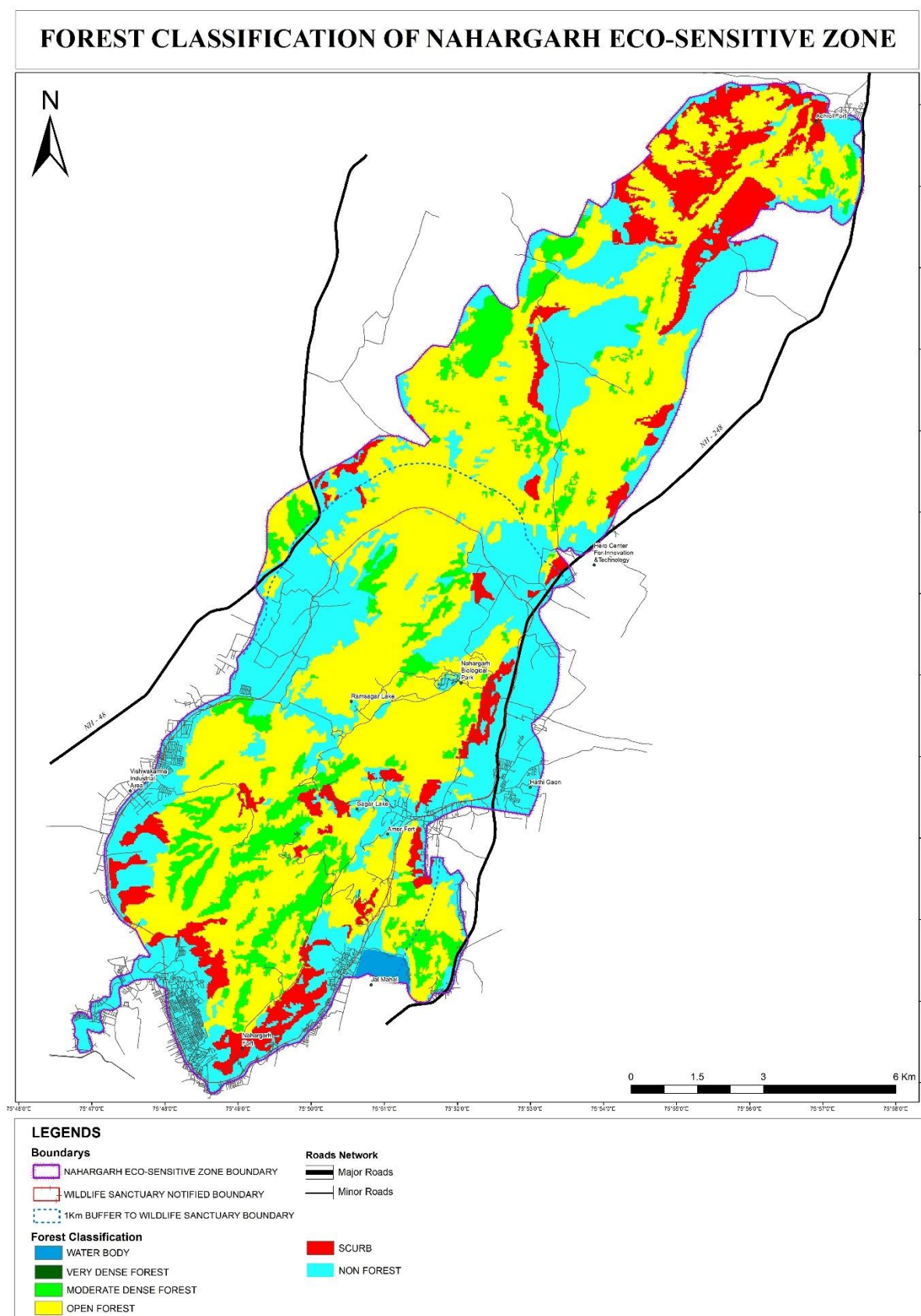


Figure No.: 2.2 Forest Classification Map Nahargarh as per FSI

According to data obtained from the Forest Survey of India concerning forest quality, it is categorized into 3 segments i.e., Very Dense Forest, Moderate Dense Forest, Open Forest. Further two other classes have been shown namely Shrub & Non-Forest. In case of Nahargarh Eco Sensitive Zone, there are only two types of classification of forest available i.e. Moderate Forest and Open Forest. Out of the total area of Nahargarh ESZ, only 9.32 % of the area comprises moderate forest while 47.91% is open forest. 9.70% area is categorized under shrubs and 32.59% area is under Non-Forest Category. The details are shown in Figure 2.2.

2.2.3.1 Ecological Classification of Vegetation Types

The Nahargarh-Amer Forest Range is dispersed across a significant region on different types of soil and geological formations, and it varies in composition and quality. Their distribution is determined by edaphic and biotic variables. In valleys with superior soil and moisture conditions, trees flourish well. Dhok (*Anogeissus pendula*) is the most prevalent species of tree, covering more than 80% of the land. Its relatives, such as Salar (*Boswellia serrata*) and Gurjan (*Linnea coromandelica*), flourish in arid climates and on rocks.

The trees normally grow slowly and don't become very tall. Trees range in height from 4.5 metres to 7.5 metres. In ideal locations, heights of up to 12 metres are possible which are Imli (*Tamarindus indica*), Aam (*Mangifera indica*), Jamun (*Syzygium cumini*), Tendu (*Diospyros melanoxylon*), Churel (*Holoptelia integrifolia*), Siris (*Albizia lebbek*), Ficus spp. etc. which grow in moist localities achieve large size, both in crown spread and height. Where valleys are exposed and there are nallas, the plant Kalam (*Mitragyna parviflora*) thrives gregariously.

These forests have been classified based on their composition as follows:

- (i) Dhok forest
- (ii) Salar forest
- (iii) Miscellaneous forest



2.2.3.2 Composition and condition of forest distribution of each type under the following heads;

I. Dhok (*Anogeissus pendula*) Forest

This is the principal species growing in the area. This corresponds to 5/0-1, *Anogeissus pendula* forest type, which is an edaphic climax in the tropical dry deciduous forest, according to Champion & Seth (1968). The Dhok is a gregarious tree species and is often found in pure stands on the middle slope of the hills, where it may form over 80 percent of the crop. Dhok leaves are good fodder. They are browsed while on the trees and when dried and fallen on the ground. The process of turning leaves from rusty red to brown and finally gray starts in November. By March, the trees become leafless, leaving sufficient leaf forage on the ground.

The familiar associates of Dhok are Tendu, Khimi (*Wrightia tinctoria*), Gurjan (*Lannea coromandelica*), Dhak, Churel, and Ber (*Ziziphus mauritiana*), which are found at the foot of the hills, in valleys and along Dallas. Tree species like Jamun (*Syzygium cumini*), Kadam (*Mitragyna parvifolia*), Gular (*Ficus glomerata*), and Rohini (*Mallotus philippensis*) are found in moist localities.

II. Salar (*Boswellia serrata*) Forest

Next to Dhok, Salar is the principal tree species in these forests. This type corresponds to 5/E-2, "Boswellia Forest", which is an edaphic climax of Group 5, "Tropical Dry Deciduous Forest", according to Champion & Seth (1968). It is found on hilltops and is mixed with Dhok up to the middle of the slopes. The common associates are Gurjan, Tendu (*Diospyros melenoxylon*), Dhaman (*Grewia latifolia*) etc. The forests add to the beauty of the landscape when their leaves start turning rusty and pale yellow in September before fall.

III. Miscellaneous Forests

a) Moist Miscellaneous Forests along Nallahs

These are found along nallahs, rivers and tanks, which are perennial. The vegetation corresponds to Type 1 S/l Dry Tropical Riverian Forest according to Champion & Seth (1968). The Common species found are Gular (*Ficus glomerata*), Dhak, Jamun, Kalam, Khajur (*Phoenix sylvestris*), and Rohni. They produce fruits rich in sugar.



b) Other Miscellaneous Forest

Miscellaneous forests of inferior nature correspond to E/8, Saline/Alkaline Scrub Savannah consisting of Jal (*Capparis sepiaria*), Hingot (*Balanites aegyptiaca*), Kair (*Capparis decidua*), Bel (*Aegle marmelos*), Ghatbor (*Ziziphus xylopyrus*); and Jhariber (*Ziziphus Nummularia*). Their fruits are liked by animals especially in summer when forage is dry and many times it is not available.

2.2.3.3 Formation Types of forests**a) Wood Level**

Dhok (*Anogeissus pendula*), Salar (*Boswellia serrata*), Kadamba (*Mitragyna parvifolia*), Tendu (*Diospyros melanoxylon*), Churel (*Holoptelea integrifolia*), Safed Dhok (*Anogeissus latifolia*), Gurjan (*Lannea coromandelica*) etc. are the main species which that form wood level.

b) Scrub Level

Scattered trees of Dhak (*Butea monosperma*), Bel (*Aegle marmelos*), Ber (*Ziziphus mauritiana*), Ronjh (*Acacia leucophloea*), Rohini (*Mallotus philippinensis*), and Hingot (*Balanites aegyptiaca*) etc. form the scrub level forests. The open scrub has stunted trees regularly destroyed by cattle and other animals.

c) Field Level

The scrubby growth which is moderate to sparse depending upon the density of tree canopy consists mainly of chapren (*Grewia flavescens*), Gagren (*Grewia tenax*), Adusa (*Adhatoda vasica*), Dansra (*Rhus* spp.), and *Dichrostachys cinerea* etc.

d) Ground Level

Herbaceous flora is generally scanty and consists of herbs like Adhasisi (*Xanthium strumarium*), *Capparis zeylanica*, Lampla (*Aristida depressa*), Bharut (*Cenchrus barbatus*), Gorla (*Chrysopogon fulvus*), and Surwala (*Heteropogon contours*), which occur in open patches.

2.3 Soil

Nahargarh ESZ area Four types of soils are observed in the area, they are: -

1. Coarse Loamy, 2. Fine Loamy, 3. Sandy, 4. Loamy Skeletal. On the basis of soil type, the properties of soil changes e.g. permeability, porosity, water-holding capacity, water-retaining capacity, etc. Selection of site of Rainwater Harvesting Structures should



be done considering the soil at the location. The soil having high clay content is best suited for Rainwater Harvesting Structures as water retaining capacity is high for clay soil. Fine loamy is best suited soil for Rainwater Harvesting Structures.

2.3.1 Soil Type

Physiography affects the soils of a region. The whole of the Aravalli Range in Rajasthan, and hill tracts can be subdivided into the following physiographic units:

1. The North-Eastern Hill tracts or the Alwar Hills
2. The Central Aravalli Range
 - a) The Sambar basin or Shekhawati low hills
 - b) The Merwara Hills
3. The Mewar Hill and Bhorat Plateau
4. Abu Block
5. The Vindhyan Scarps

Jaipur is located in the Eastern side of Rajasthan, and is surrounded by the Aravalli Hills at its three sides, thus its soils are also impacted by the Aravalli Hills. A Major part of the ESZ area is occupied by rocks of the Delhi system and Aravalli system comprising quartzite, conglomerates, grits, limestone, phyllite, granites, and schist topography. Most of the high ridges are comprised of quartzite, conglomerates, and grits. The inter-linking valleys consist of limestone, phyllites, and schist. Evidence of lava conglomerates is also occasionally encountered. Soil differs depending on the underlying rock. These ancient crystalline and metamorphic rocks with gneisses etc. are generally covered by red sandy soils. Red soils are generally poor in nitrogen, phosphorus and humus contents and are alkaline in nature.



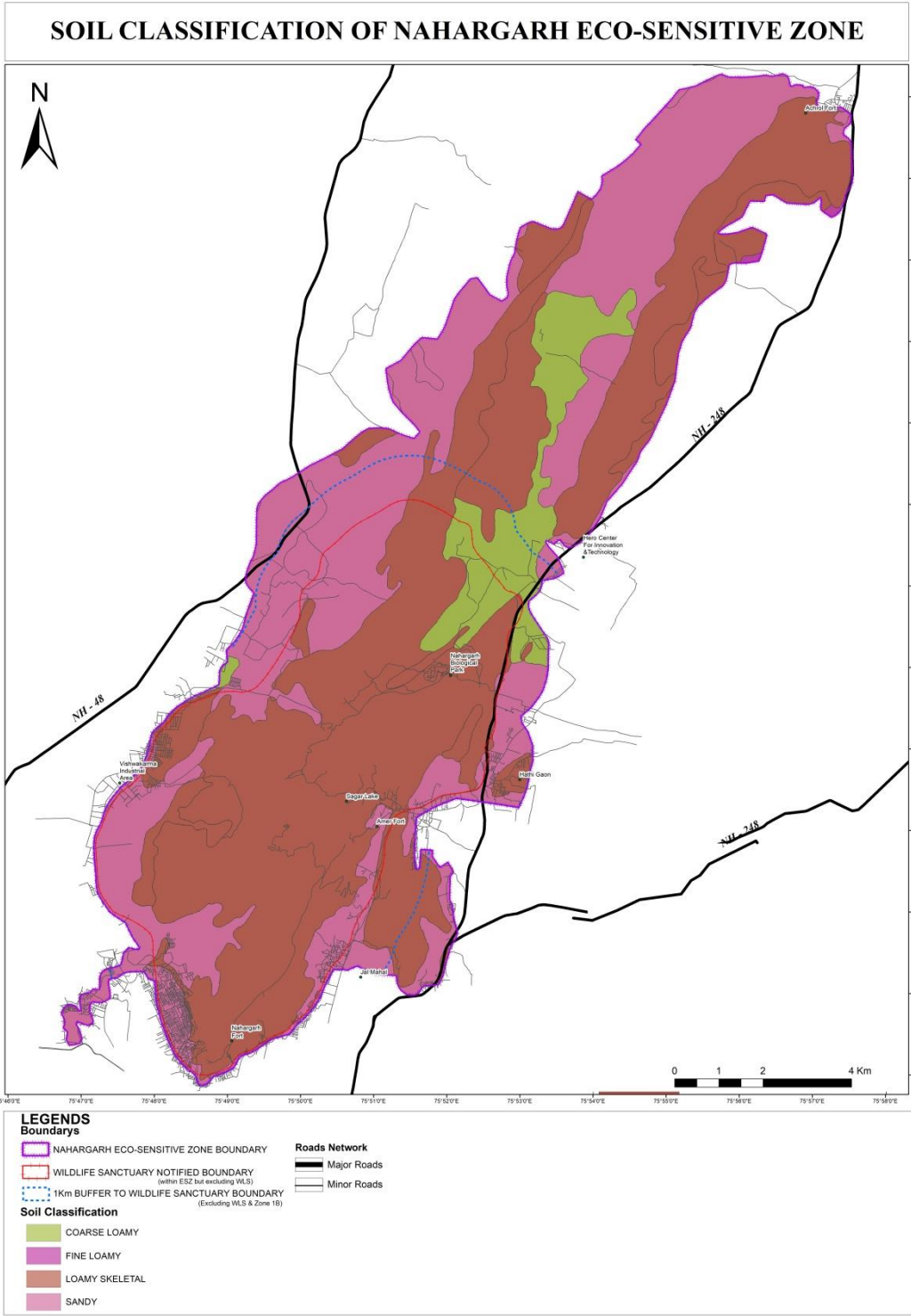


Figure No.: 2.3 Soils in Nahargarh ESZ

There are comparatively rich, fertile and dark colored soils in plains and valleys in ESZ area. The soils resulting from the weathering of schistose rocks varies from sandy to heavy loam depending upon the amount of quartzite present in the parent rocks. Four types of soils are observed in the ESZ area given in the table below:

Table: 2.1 Soils of Nahargarh ESZ

S. No.	Soil Type	Area (ha)	Share (%)
1.	Coarse Loamy	1,025.18	7.21
2.	Fine Loamy	13.64	0.10
3.	Loamy Skeletal	7,738.93	54.46
4.	Sandy	5431.93	38.23
	Total	14,209.68	100.00

The maximum area is covered by the loamy skeletal soils (54.46%), followed by Sandy soils (38.23%), and Coarse Loamy soils (7.21%), and least share of Fine Loamy (0.10%).

2.3.2 Soil Fertility

Soil Fertility is the subject of gradients available in the soil. Fertility is also determined by the hardness of soil substances. In Nahargarh ESZ, soil fertility can be correlated by viewing the LULC map of the ESZ. Viewing the map, the area around the settlements of Jaitpur Kheench, Chparari, Bishangarh, Kookas and Khurad are engaged in the agriculture activity that depict the favorable soil fertility.

The shrub land in the ESZ depicts the semi-arid (desert) vegetation which shows less soil fertility due to poor soil condition & rocky terrain of the area in the ESZ. Moisture content & evaporation decides the soil fertility adding/ retaining the moisture contents will improve the soil fertility. In case of Nahargarh ESZ, the amount of rainfall is less while evaporation is high, a result, less moisture content is retained by the soil, and therefore, the fertility is also less in the ESZ. Another, important factor affecting ESZ soil is the degradation of the soil due to erosion and steep slopes in the area and also due to poor vegetation cover. The ESZ area around the sanctuary is highly degraded due to loss of soil layer by the annual erosion.

2.3.3 Soil Erosion in ESZ

Soil erosion has been estimated from Modified RUSLE method using SWAT (ArcGIS) technique. Soil Erosion Equation is $A = R * K * L * S * C * P$

Where, A= computed average annual soil loss (tones/ha/year),

R= rainfall- runoff erosivity factor,

K= soil erodibility factor,

L = slope length factor,

S= slope steepness factor,



C = cover management factor,

P = conservation practice factor.

In the Nahargarh ESZ area, soil erosion varies from 0 to 450 tone/ha/year. The average soil loss is 66.69 tone/ha/year.

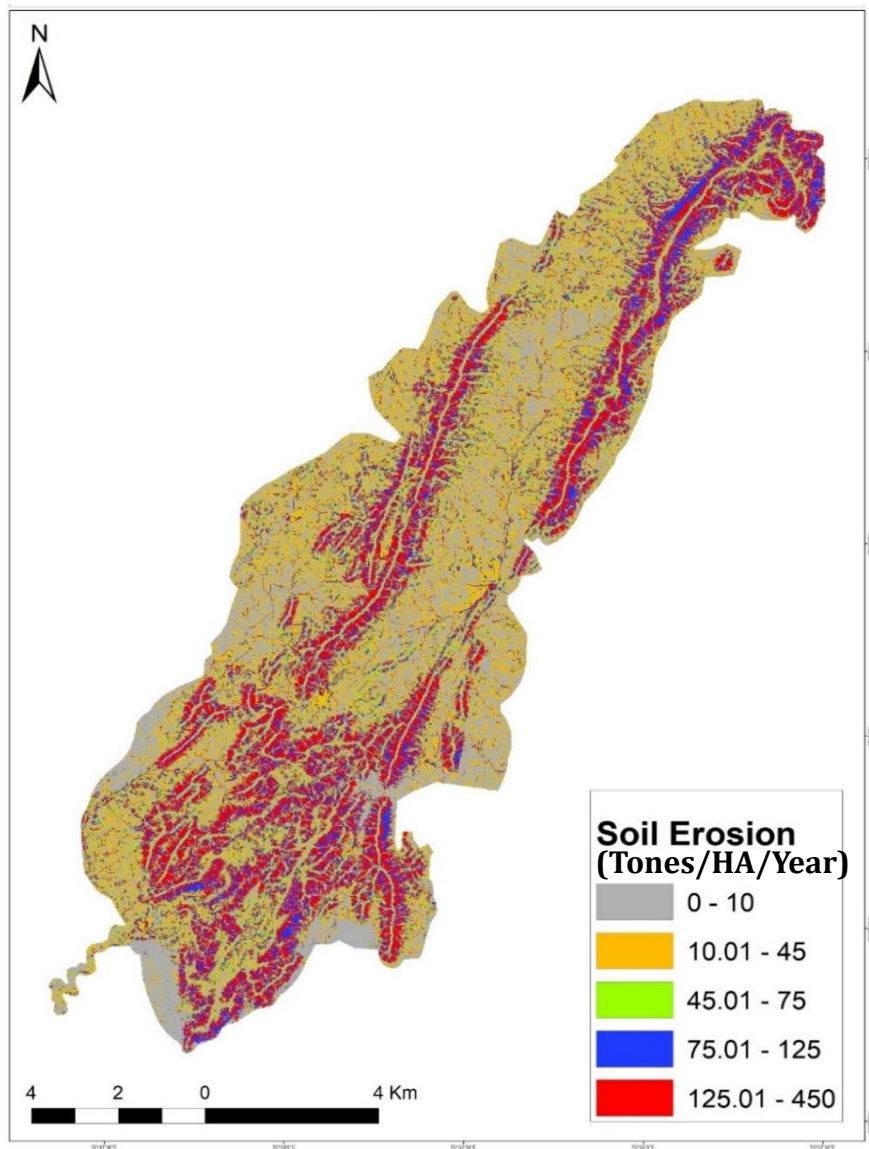


Figure No.: 2.4 Range of Annual Soil Erosion in Nahargarh ESZ, 2022

Table: 2.2 Range of Annual Soil Erosion in Nahargarh ESZ, 2022

S. No.	Erosion (Tones/HA/Year)
1.	0 - 10
2.	10 - 45
3.	45 - 75
4.	75 - 125
5.	125 - 450

2.4 Climate

Jaipur is located in the semi-arid zone of India, which is characterized by high temperatures, low rainfall, and a mild winter. Coming to the climate of Nahargarh ESZ tract is sub-tropical characterized by distinct winter, summer, and monsoon. Spring, as elsewhere in India, is short. The summer season commences from middle of March and the heat soon becomes intensive in April. Hot Westerly winds known as "LOO" are common during April, May and part of June. This period is extremely hot. The nights are generally pleasant even during summer.

Rainy season commences from late June and continues till middle of September. The first few showers in this well drained area of Nahargarh Sanctuary is most enjoyable. However, later high humidity and heat makes the climate oppressive.

The winter season commences from November. It becomes cold in December-January. Some of the nights are frosty and the valleys of Nahargarh become frost-holes.

2.4.1 Temperature

The mean temperature of Jaipur is 36 °C, varying from about 18 °C in January to about 40 °C in June, the hottest and coldest months respectively. However, the full temperature range of Jaipur is 45 °C to 1 °C. Jaipur's winter season begins in November and temperature decreases until January (generally with a minimum temperature of 8 °C). The monsoon season decreases temperature in late June or July (see Table 2.3).

Table: 2.3 Mean Monthly Temperature (Max and Min) of Jaipur City and Surrounding

Sr. No.	Month	Average Temperature	
		Maximum	Minimum
1	January	22.2	8.4
2	February	24.5	10.7
3	March	31.6	16.6
4	April	37.3	20.5
5	May	41.1	26.3
6	June	39.5	27.5
7	July	33.3	29.9
8	August	31.6	24.3
9	September	32.6	23.0
10	October	33.6	17.9
11	November	29.5	11.7
12	December	25.1	8.5

Source: (Roberts, Reiner, & Gray, 2013)



2.4.2 Rainfall Pattern and Distribution

The average annual rainfall of Jaipur is slightly less than 600 millimeters (mm). A 90 percent of the rainfall in Jaipur occurs during the summer monsoon season, which lasts from June to September. Remaining 10 percent of the rainfall of Jaipur is a result of winter cyclones. Overall, rainfall in Jaipur is highly variable from year to year. It has been calculated that there is a 25% probability that annual rainfall of Jaipur will exceed the average, and a 19.7% probability that Jaipur will encounter a drought season. August is the rainiest month for Jaipur, as well as for the state of Rajasthan, with a relative humidity of 84% for Jaipur. The higher rainfall, which occurs during July and August, occurs in downpours that cause excessive runoff and are not too useful in recharging groundwater aquifers. The South-East Monsoon, which occurs in July, August, and September, is mostly responsible for the precipitation. The Winter (January-February) rain showers are few. The average number of rainy days in a year is 30. Jaipur received the heaviest rainfall of 1402.8 mm in 1892 while in 1905 it received minimum rainfall of 120 mm.

2.4.2.1 Rainfall Coefficient and Intensity in Nahargarh ESZ

Daily rainfall data for 41 years from 1980 to 2020 are taken from India Meteorological Department (IMD), Pune for analysis of the rainfall variation of various return periods. Rainfall frequency analysis is required for assessing the possible submergence and spread of lake areas.

The running chapter discusses on the area and time distribution of various rainfall of given duration, which finally decides the locations for water harvesting structure in area and time distribution curves of various rainfall. Rainfall data of Amer region has been considered for interpolating the rainfall for the area.



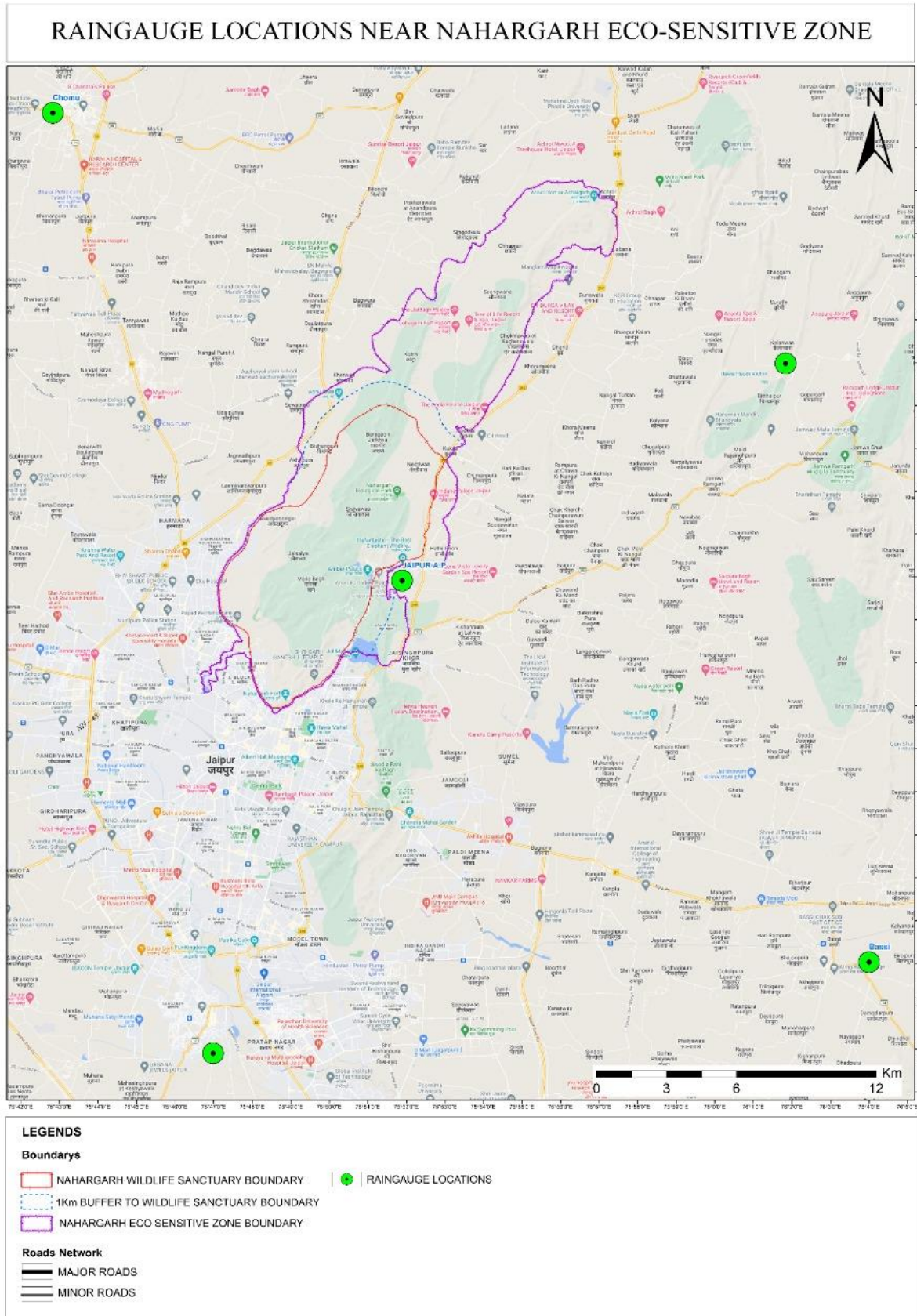


Figure No.: 2.5 Raingauge Locations near Nahargarh ESZ

a) Frequency analysis of 1-day maximum annual rainfall using Log Normal Distribution

Annual maximum 1-day rainfalls of 41 years from 1980 to 2020 have been analyzed to find out 1-day rainfall of various return periods. Lognormal Probability Distribution function is used for estimating the 1-day annual rainfall of other return periods. Table 2.4 provides the value of 1-day annual rainfall for different return period using Log normal Distribution for 01 rain gauge station Amer.

Table: 2.4 Annual maximum 1-day rainfall Log Normal Distribution

Sr. No.	Return period (T) in years	Log Normal Distribution (Values in mm)
1	2	80.7
2	10	148.0
3	25	184.8
4	50	213.3
5	100	242.6

Source: Calculated based on IMD, Pune (2022).

b) Frequency analysis of 1-day maximum annual rainfall using Log Pearson Type III

The same data are subjected to Log Pearson Type III Probability Distribution function and values for 1-day maximum annual rainfall data are generated. Table 2.5 provides the value of 1-day annual rainfall for different return period using Log Pearson Type III.

Table: 2.5 Annual maximum 1-day rainfall using Log Pearson Type III Distribution

Sr. No.	Return period (T) in years	Pearson type III (Values in mm)
1	2	82.0
2	5	146.2
3	10	178.2
4	20	201.8
5	25	225.0
6	50	248.2
7	100	302.2

Source: Calculated based on IMD, Pune (2022).

c. Frequency analysis of 1-day maximum annual rainfall using Gumbel EV Type I Distribution

The same data are subjected to Gumbel Extreme Value Type I Probability Distribution function and values for 1-day maximum annual rainfall data are generated. Table 2.6 provides the value of 1-day annual rainfall for different return period using Gumbel EV Type I Distribution.



Table: 2.6 Annual maximum 1-day rainfall using Gumbel EV Type I Distribution

Sr. No.	Return period (T) in years	Gumbel EV Distribution (Values in mm)
1	2	83
2	5	127
3	10	155
4	20	183
5	25	192
6	50	219
7	100	246

Source: Calculated based on IMD, Pune (2022).

It is seen from table above that annual 1-day maximum rainfall for different return period is higher in case of Gumbel EV type I distribution than Log-normal Probability Distribution and Log Pearson Type III Distribution. For the analysis of design storm, higher values of 1-day annual maximum rainfall of different return period-obtained using Gumbel EV type I Distribution is suggested for consideration.

a) IMD estimated rainfall of different return period

As per the report on Hydro-meteorological Studies for Lower Gangetic Plains (Sub-Zone-1G) prepared by Hydrology (Small Catchment) Directorate of CWC, GoI (1978), various rainfall of different return periods is traced. The detail is given in the Table 2.7 below:

Table: 2.7 50-yr T hour rainfall for Sub-Zone-1A

Sr. No.	Rainfall Time	Amount of Rainfall
1	50-yr 15 min. rainfall	30 mm
2	50-yr 30 min. rainfall	50 mm
3	50-yr 60 min. rainfall	95 mm
4	50-yr 3 hr rainfall	118 mm
5	50-yr 6 hr rainfall	137 mm
6	50-yr 12 hr rainfall	178 mm
7	50-yr 15 hr rainfall	170 mm
8	50-yr 24 hr rainfall	205 mm

Source: Calculated based on IMD, Pune (2022).

24-hour rainfalls corresponding to Nahargarh ESZ are generated using Log Pearson, Log-Normal, Gumbel EV Type I and IMD methodology and following values are recommended for Rainfall Analysis of the region.

24-hour rainfall of 20 years return period = 183 mm

24-hour rainfall of 50 years return period = 219 mm

24-hour rainfall of 100 years return period = 246 mm



b) Procedure for converting daily rainfall to short duration rainfall

IMD has analyzed the rainfall pattern in the Sub-Zone-1A using data collected from concerned zonal railways viz. Eastern and the South Eastern from 29 bridge gauging sites. Accordingly, the rainfall estimates corresponding to duration from 1 to 18 hours is converted into ratios with respect to 24-hours rainfall. The averaged values of ratios for various durations for converting 24-hour rainfall into short durations are given in the following Table 2.8:

$$P_t = P_{24} \left(\frac{t}{24} \right)^{\frac{1}{3}}$$

Table: 2.8 Ratio for converting 24-H Rainfall into Short duration with the Formula given by IMD

Durations (hr)	0.25	0.5	0.75	1	2	3	4	5	6	12	18	24
Ratio	0.22	0.27	0.31	0.34	0.43	0.50	0.55	0.59	0.62	0.79	0.91	1.0

Source: Calculated based on IMD, Pune (2022).

The Intensity- Duration-Frequency (IDF) Curves generated for different rain gauge stations for the past 41-year rainfall data with Gumbel EV Type I Distribution are as shown:

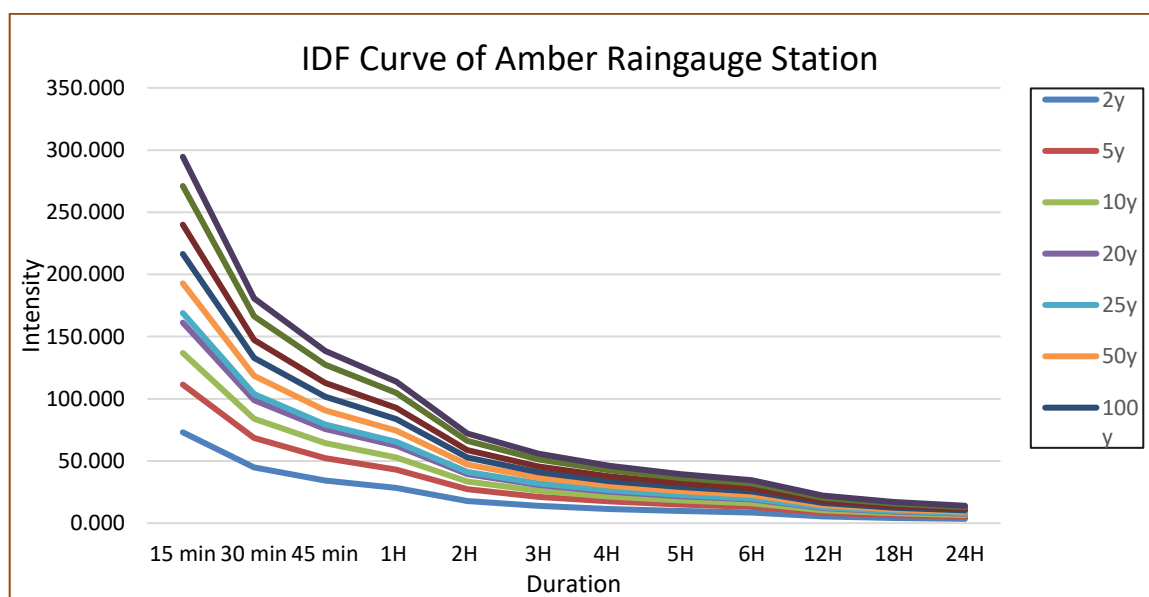


Figure No.: 2.6 IDF Curve of Amber Rain Gauge Station

Source: Calculated based on IMD, Pune (2022).

For the purpose of rainfall variation analysis, 3-event of rainfall have been taken into consideration taking data of previous 41 years for Nahargarh ESZ.

- Maximum 1-day rainfall
- Moderate 1-day rainfall
- Minimum 1-day rainfall



2.4.3 Humidity

The lowest humidity is observed in the month of May (see Table 2.11). June onward humidity picks up and increases gradually to have its highest values in the month of August. After this, it decreases slowly up to the month of October. Again, shows an increasing tendency for three months namely November, December, and January. From next month onward, the humidity again shows a decreasing trend and attains its lowest value during the month of May. Dew occurs during winter from October to February. Frost nights are common especially in valleys all over the tract. Nahargarh Valley is the most affected region where even the tall trees of the height of 5 meters are adversely affected (1966-67).

Table: 2.9 Monthly Average Rainfall, No. of Rainy Days and Relative Humidity of Jaipur and Surroundings

Sr. No.	Month	Rainfall (in mm)	No. of Rainy Days	Relative Humidity (%)
1	January	11	0.9	58.0
2	February	8	1.0	57.5
3	March	9	0.8	41.5
4	April	4	0.5	34.2
5	May	15	1.5	30.1
6	June	57	3.7	51.1
7	July	197	10.2	67.2
8	August	205	10.0	87.4
9	September	82	5.0	73.6
10	October	12	0.7	41.1
11	November	4	0.3	56.2
12	December	8	0.7	57.2
13	Annual	612	35.3	

Source: (Roberts, Reiner, & Gray, 2013)

2.4.4 Wind Direction and Wind Speed

Generally, the average monthly wind speed varies from 3.0 to 10.0 km/hour over the year. However, maximum wind speed is noticeable during the summer due to dust storms and dust-raising winds, wind speed reaches up to 10 km/ hour. The maximum wind speed recorded at Jaipur was 113 km/hour on 31 May 2001 (Indian Meteorological Department (IMD), 2011).

Summer is windy season for Jaipur. The average wind speed is 6-10 kmph. During daytime when the Sun shines, the intense heating causes convective movements and the wind speed increases. In the month of March and April, the wind direction is East to South-Easterly during morning hours and North-Westerly in all the three months of season during evening hours. In addition, the wind speed increases from morning to evening. During summer, the wind blows from the South- East. Dust storms occur in late May and



June. During the winter season, generally wind blows from East to the North direction with the speed of 1 to 5 meters per second. Wind velocity is the maximum in June and the minimum in December.

2.5 Waterbodies, Drainage, and Watersheds

This section deals with the waterbodies in and around the Nahargarh ESZ and Amer sub-districts. Furthermore, the drainage and watersheds will also be discussed.

2.5.1 Lakes of Amer and Surroundings

The city's lakes further enhance Jaipur's beauty and make it the “paradise” of the desert region. Visiting lakes make the visitors re-energized. Lakes in and around the Amer with reference to Nahargarh ESZ are being discussed below:

a) Maota Lake

It is located on the South side of the Amer town, close to Amber fort. There is a garden in the center of Maota Lake namely Kesar Kyari Bagh with star shaped flowerbeds and saffron flowers. The lake provides a placid setting from which to look up at Amer Fort on the hillside; reflected on the water's surface.

b) Sagar

One of the best-kept secrets of the city of Amer is a 17th century lake ‘Sagar’, which was the initial source of water for the adjoining forts of Amer and Jaigarh as well as the town of Amer and its people. Skidded away beyond Kheri Gate & the Anokhi Museum, the lake can be reached by car and then one can walk around its borderline, which is divided into two parts- the Upper Sagar and the Lower Sagar. If you are visiting Amer or the Anokhi Museum in the evening, do stop by. The sunset turns the mud-plastered walls of Amer into a golden warren waiting to be explored.

c) Man Sagar Lake

It also acts as a Tourist place due to the proximity to Amer fort and only water body in Jaipur, which attracts the people from world wise and all age group people. Mansagar Lake also known as Jalmahal is the significant lake with an area of 121.41 hectares. It is a manmade water body created by damming Darbhawati River near Nahargarh Fort in 1610 for irrigation and recreation purpose by Raja Man Singh I. A palace was built in the middle and temple on North-West of this lake.

This lake has houses more than 150 species of migratory and resident birds. The lake downstream is used for vegetable cultivation and irrigation. Earlier the sewage from the



walled city of Jaipur was diverted into the lake and extensive deforestation in the surrounding hills has resulted in rapid siltation and reduced water storage capacity of the lake. However, after construction of STP the sewerage is not dumped in the lake but the lake gets the treated water from Sewerage Treatment Plant and the raw sewerage is diverted downstream. The lake also gets natural water from the catchment areas lying on Western as well as Northern side.



Maota Lake



Sagar Lake



Man Sagar Lake

Figure No.: 2.7 Lakes in and Around Amer Fort, Jaipur

Water temperature of Jal Mahal Lake varies from 14.0 C to 31.10° which is highest in the region (Sarivastav, Harit, & Srivastav, 2009) following are the key concerns of these lakes based on sample study from respective lakes.



Figure No.: 2.8 Google View of Lakes in and Around Amer Fort, Jaipur

Based on the study conducted in 2006 (Sarivastav, Harit, & Srivastav, 2009) the following physio-chemical properties are found in these lakes.

- In the majority of studies conducted on water bodies, the pH value is generally reported between 6 to 9. In the present study, pH ranges between 7.0 to 9.2; pH range of 7 to 8 has been considered good for fish culture (Jhingran, 1997).
- Dissolved Oxygen (DO) values range from 8.64 mg l⁻¹ to 3.51 mg l⁻¹. The values tend to show a very gradual decline from winters to summers in all the four lakes.
- Hardness ranges from 91.33 mg l⁻¹ to 416.7 mg l⁻¹. Observations reveal that the values of hardness are in decreasing order from Jalmahal > Amer > Nevta > Ramgarh.
- Jalmahal Lake is most polluted having high alkalinity, free CO₂, hardness and pH but a low level of DO. Endosulfan and Zinc contents are also high in Jalmahal Lake, thus making it unsuitable for biota and fish.

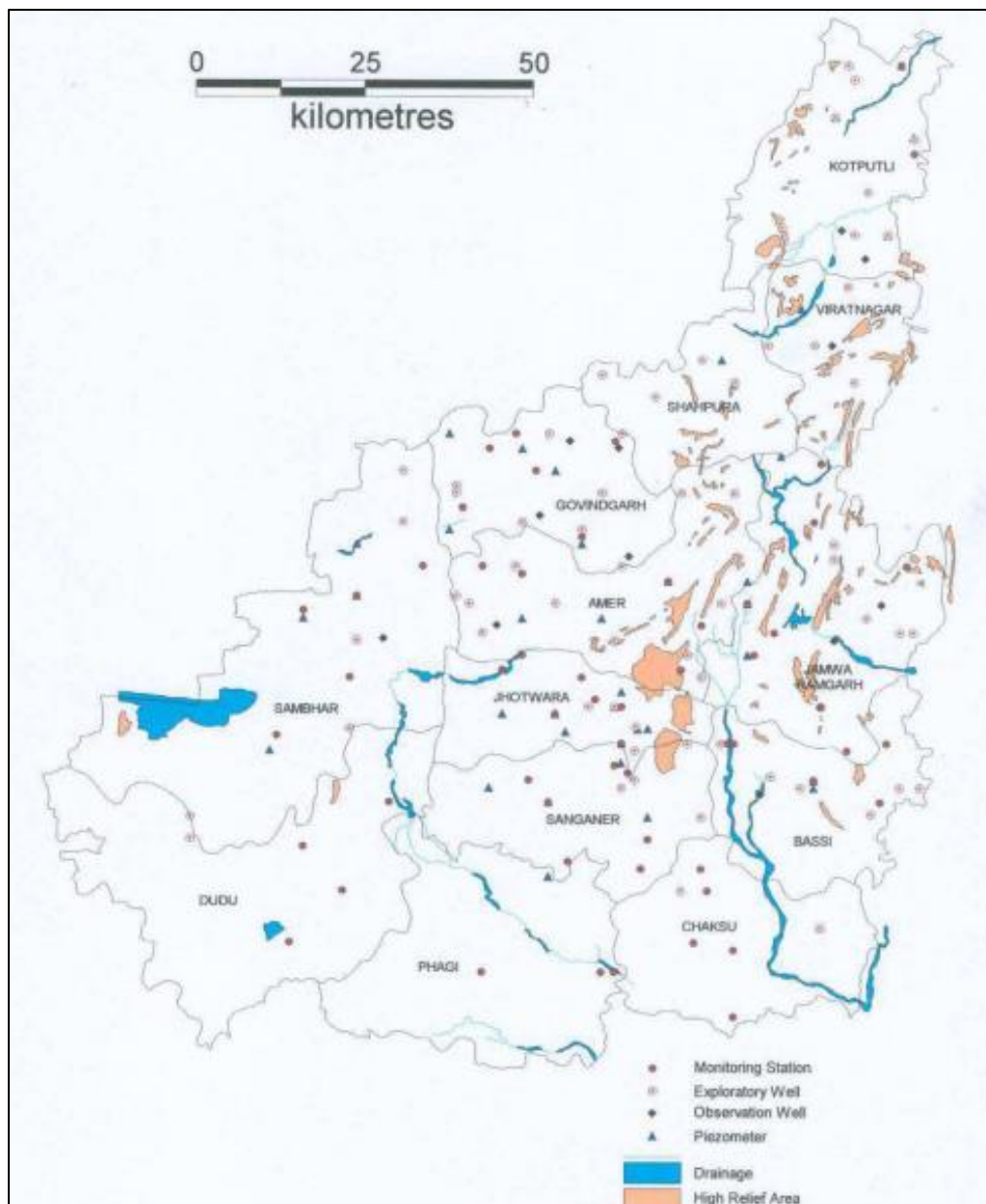


Figure No.: 2.9 Drainage and Water Shed Map

2.5.2 Drainage and Watersheds

The topography of a region decides its drainage pattern and watersheds. Water needs were a great concern when the city of Jaipur was planned and constructed. The city was planned to take advantage of the topographic features that allow natural drainage and stormwater runoff through soils with high percolation rates. Natural drainage of the topography was utilized, as evident through the dividing line of Jaipur, with Suraj Pole Gate on the East to and Chand Pole Gate on the West, in which the side North of this dividing line would have drainage to the North and the side South of this line, would have drainage to the South (Roberts, Reiner, & Gray, 2013).

Jaipur is surrounded by the Nahargarh hills in the North and Jhalana hills in the East, which is a part of the Aravalli hills. The higher elevations in the North of the city are the low, flat-topped hills of Nahargarh, Jaigarh, Amber, and Amargarh, which are now extremely dissected and eroded. The range of the Aravalli hills continues farther North, towards Alwar and Kotpuli, and finally disappears near Delhi. To the South and West of Jaipur are prevailing hills, but they are isolated and discontinuous. The Southern end of the city is open to plains. The slopes of the South are in general gentle.

- The hills surrounding the city do not run in a single range, but are traversed by passes and depressions. Three passes exist-one in the East, one in the North, and one in the West.
- The Eastern hills run from its Southern end to the Purana ghat pass as a single block known as the Jhalana hill, with another block starting at Purana ghat and known as Gulta hill. At Surajpol Gate there is a passage leading to the holy tank of Galta, with Gulta hill continuing to the North.
- Further Northward there is another depression, which was blocked by Maharaja Man Singh I to create Man Sagar Lake. The Jaipur-Jamwa Ramgarh Road cuts through this pass, as well. At the junction of the Eastern and Western hills in the North, an area formerly known as Govind Ghati, is a pass through which the Jaipur-Delhi Road traverses.
- The Western hill is punctuated by one pass, which starts from Gaitor in between the Nahargarh hill and Ganeshgarh.
- The Southern part of this Western hill is known as Nahargarh hill, and the Northern portion of this Western hill is known as the Amber hills. There is a small colonial mount known as Moti Doongari in the Southern part of the triangular plain.

2.5.2.1 Watersheds and Drainage of Nahargarh ESZ

For understanding of drainage network, topographic maps of the Nahargarh ESZ area were generated, was used in this regard. Based on the SRTM-DEM, 1 Arc Second Global data were used and following topographic map were generated:

- i) Contour lines are shown in Base Map (Annexure-1)
- ii) Watershed Map
- iii) Stream Network Map
- iv) Stream Order Map



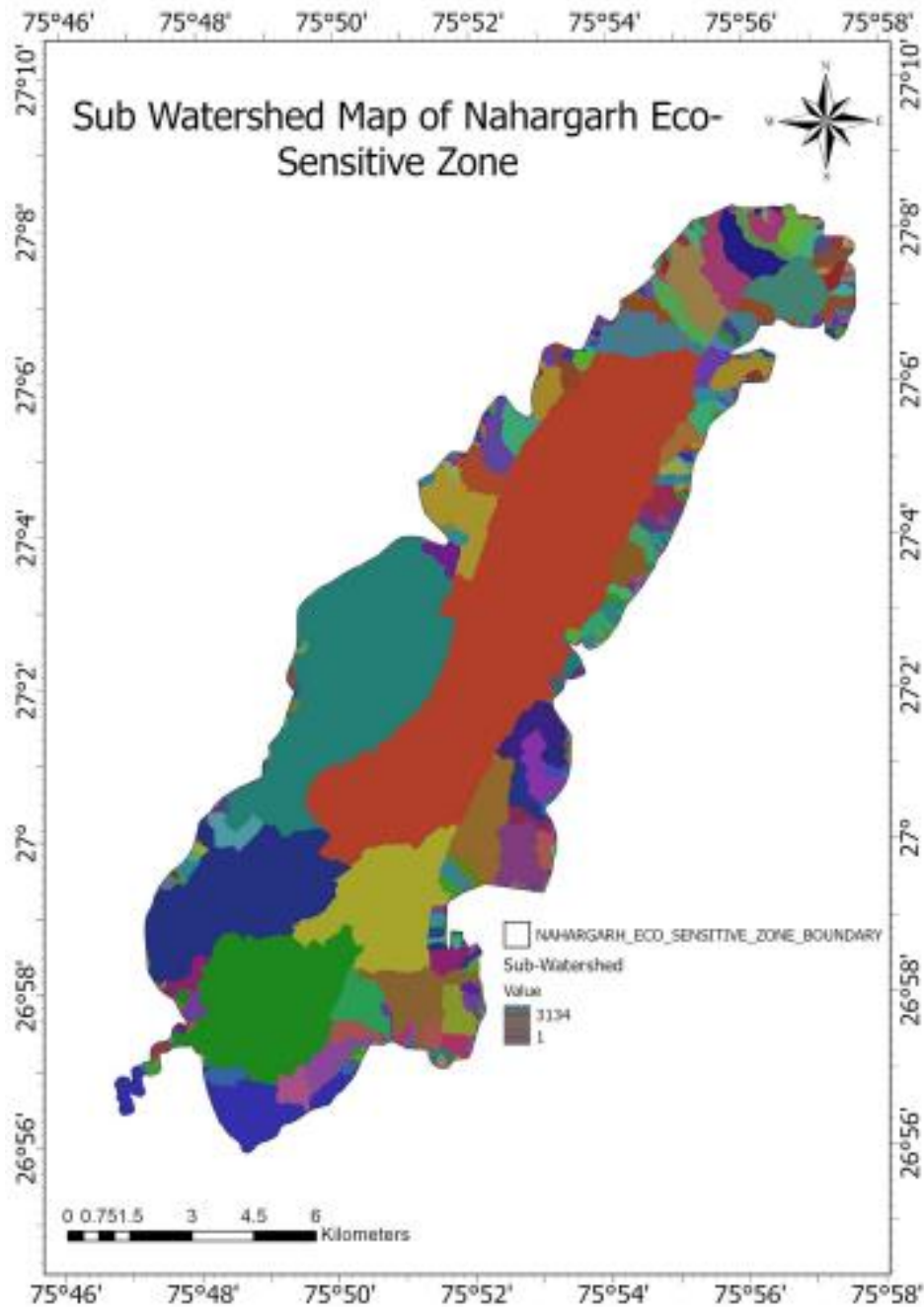


Figure No.: 2.10 Watersheds in Nahargarh ESZ

Analysis of the above-mentioned maps, natural flow of the Nahargarh ESZ was identified, which is synchronous to the drainage of the ESZ area.

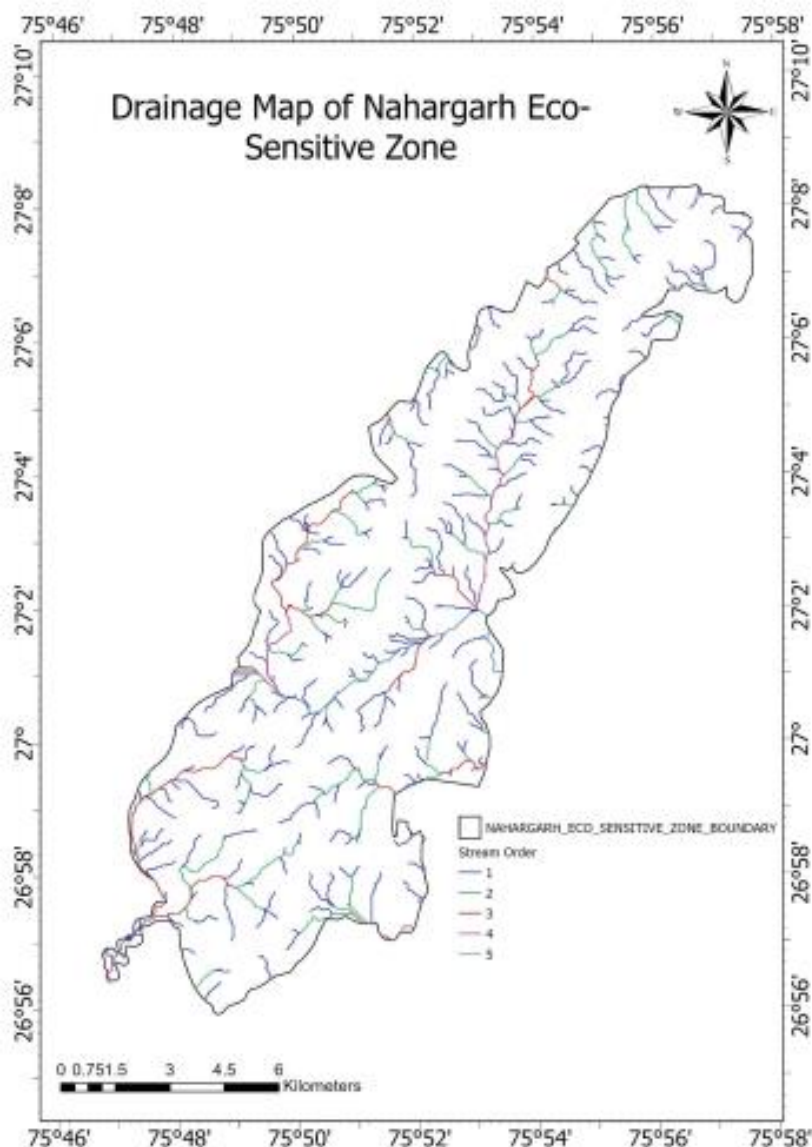


Figure No.: 2.11 Stream Order and Stream Network in Nahargarh ESZ

Central Ground Water Board (CGWB) periodically monitors the National Hydrograph Network Stations (NHNS) four times in a year in the Jaipur district i.e., in January, May (Pre-monsoon), August and November (Post-monsoon). The Nahargarh ESZ aquifer has a significant negative influence on the groundwater. There are two kinds of aquifers i.e., Quartzite and Younger Alluvium type, are noted based on the Atlas Map of Jaipur.

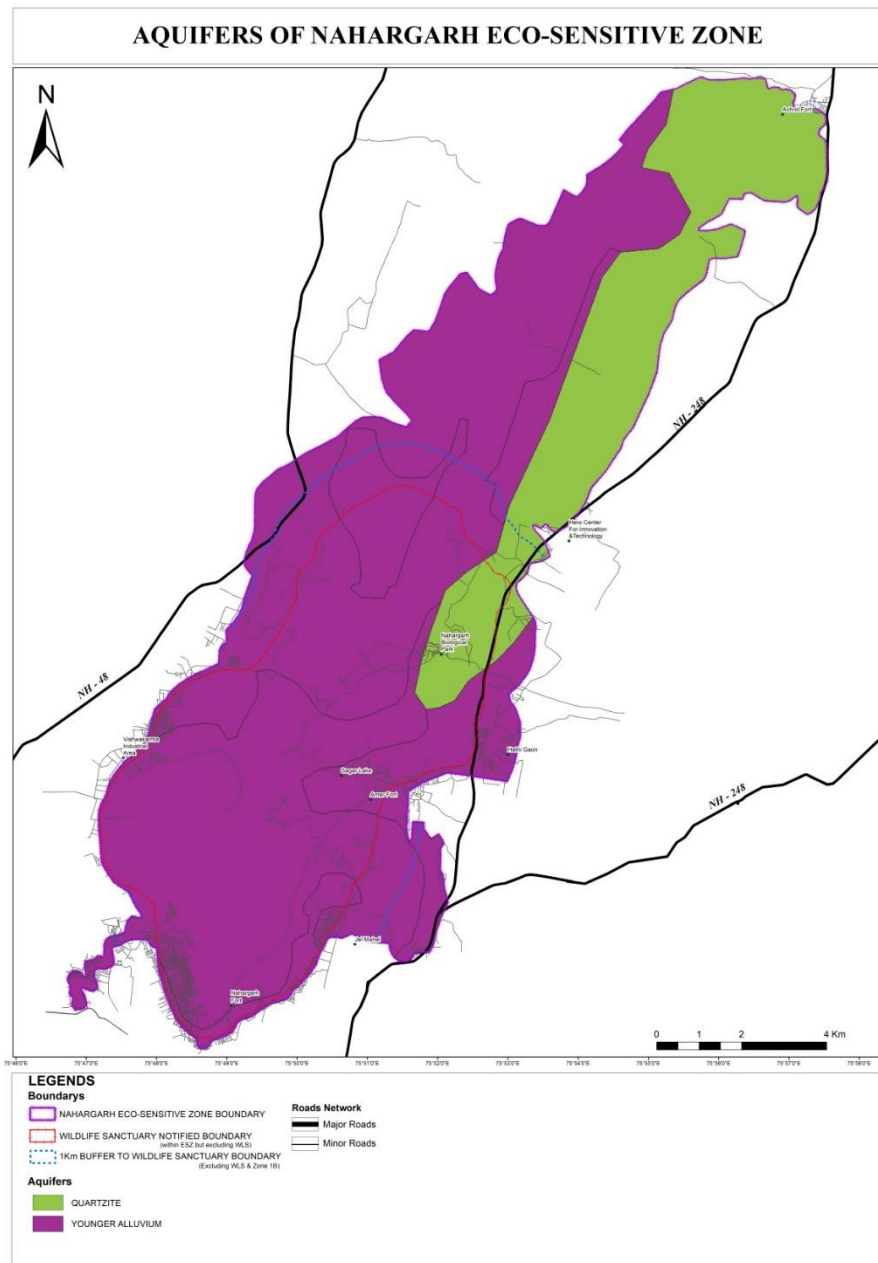


Figure No.: 2.12 Aquifer in Nahargarh ESZ

Source: Prepared based on Atlas of Jaipur (2022)

Viewing the above aquifer map of the ESZ, it is noticed that the younger alluvium type aquifer is dominating comparative to quartzite aquifer.

3. ECOLOGY AND BIODIVERSITY STUDY OF ESZ

3.1 Introduction

The biological environment is represented by the living component or biological diversity (biodiversity) of the ecosystem. The biodiversity of today is an outcome of a large number of ecological processes occurred over billions of years of co-evolution, and guarded by the indigenous communities of humans. Biodiversity is a global asset of tremendous intangible and tangible values to present and future generations. It is the key resource for sustainable development and environmental security. Unfortunately, the threats to species and ecosystems have never been as great as these today owe to anthropogenic activities. Species and ecological processes loss have been now alarmingly high and warrants for serious consideration in economic development activities notably in development of infrastructure and communication for human well-beings.

The observations and assessment of overall ecological scenario involves details such as classification of biogeographic zone, eco-region, habitat types and land cover, distances from natural habitats, vegetation/forest types, sensitive ecological habitats such as Wetlands Sites, Important Bird Areas, Migration Corridors of important wildlife etc. present in the study area. The present document considers definition of ecological impact as “any and all changes in the structure and function of ecosystems.” In a general perspective, loss or alteration of species, communities and population structure may cause changes in ecological dynamics, interactions and functions and thereby may lead to ecological impact. Therefore, flora and fauna are documented and used in this particular study/survey as a primary tool to understand the status of ecology in core and buffer areas and analyze the ecological impact of the corresponding project.

Such baseline information provides better understanding of the situation and overall ecological importance of the area. The important ecological habitats and features were identified based on our field visits and also mapping of landuse types in the study area. We identified ecologically important habitats through primary survey, literature survey and consulting local people etc. These important ecological habitats and features were then identified on landuse map that is prepared for the study area. Biodiversity study of the proposed project area was carried out to understand the status of predominant floral and faunal groups *i.e.* trees, shrubs, herbs, grasses, herpetofauna,



avifauna and mammals. To collect data and information on specific components of the ecological system and pertinent issues widely used standard scientific methods were adopted.

3.2 Objectives of the Study

The ecological surveys were conducted with following objectives:

3.2.1 Flora

- Identification of sensitive habitats, and forest land falling within the determined study area (core +buffer zone);
- Classification of flora for any threatened, protected or endemic floral species prevailing in the study areas bases on field surveys;
- Identification of area protected under international conventions, national or local legislation and those recognized nationally and internationally for their ecological, landscape, cultural or other related value; and
- Identification of aquatic flora in the water bodies falling in the study area.

3.2.2 Fauna

- Identification of fauna (specifically amphibians, birds, mammals and reptiles) based on direct sightings, call, pug marks, droppings, nest, etc.
- Identification and classification of any species recognized as threatened (in accordance with the IUCN Red List and according to the schedules of the Indian Wildlife (Protection) Act 1972 and Amendments);
- Identification of areas which are important or sensitive for ecological reason including their breeding, nesting, foraging, resting, over wintering area including wildlife migrartory corridors/ avian migratory routes; and
- Identification and assessment of aquatic ecological resources within the study area.

3.3 Approach and Methodology

A desk review (published document) was carried out to determine the landuse and land cover (Toposheet, Satellite Imagery), vegetation type (Champion and Seth, 1962) and floral and faunal species assemblage in the study area.



3.3.1 Activities Undertaken During the Study

- Fauna survey tree, shrub, herb, climber and grass species identification and enumeration.
- Diversity of species under plantations.
- Analysis of Rare-Endangered-Threatened flora.
- Documentation of avian, reptilian, insect, amphibian, mammal and other faunal diversity.
- Observation by direct and indirect evidences (Direct evidence-sighting and hearing, indirect evidence-pug marks, nests and other sings).
- Analysis of scheduled species.
- Study habit/microhabitat for the faunal elements in the project site and surrounding areas within 10 km range from the site.
- Records of the forest department and discussion with forest officials.
- The presence of wildlife was also confirmed from the local inhabitants depending on the animal's sightings and the frequency of their visits in the project area.
- In addition, review of secondary data was another source of information for studying the fauna of the area.

This survey records the flora and fauna evident on the day of the site visit and field survey. It does record any flora and fauna that may appear at other times of the year, and such, were not evident at the time of visit. The report represents ecological status of the area evident during the particular period of the study.

3.3.2 Methodology

A. Habitat Survey:

Table: 3.1 Methods used for study of flora & fauna

Taxa	Sampling Methods
Plants	Quadrat sampling and enumeration
Butterflies	Transect, Visual encounter survey
Amphibians	Visual encounter survey (search)
Reptiles	Visual encounter survey (search)
Birds	Point count, opportunistic observation
Mammals	Tracks and signs, and visual encounter survey



B. Fauna

Ground survey were carried out by trekking the impact zone for identification of important animal group such as butterflies (insects), birds, mammals and reptiles etc inhabiting the area. The fauna was identified by using standard monograph of birds, butterflies, reptiles, mammals etc.

Survey techniques: The Visual Encounter Survey (VES) technique was used. The VES technique involves walking through the study site systematically searching for animals during a given time period. Given the elusive nature of animals, VES techniques are very effective to estimate the species richness. However, species counts of animals are very difficult, given the terrain and nocturnal habits of many species.

- I. Equipment used:** Torches for night searches, measuring tape and vernier calipers for measurements and a 'Nikon' camera with 83xzoom for photography and binocular for assessment of animal to safe distance

C. Avifauna

Species search and census: Standard methods were followed to survey the avifauna. Point count method was followed for counting the birds. Opportunistic surveys were also carried out with respect to avifaunal checklist. Identification by calls was also made for species which were not directly encountered or were hidden in the vegetation or canopy. Secondary data collected from the literature was also included in the present given list.

D. Herpeto-fauna

Amphibians and reptiles recorded during area searches were identified by visual characteristics. Aquatic searches involved examining each type of aquatic habitat.

E. Mammals

Presence of mammals was documented by using both direct sightings and indirect evidences i.e. animal burrows/holes, scats, pellets, droppings and tracks. Opportunistic sightings were also included. Circular Plots were used to search indirect evidences.

F. Flora

The present study on the vegetation assessment for the project activity is based on field survey of the area. The plant species were also identified with the help of taxonomists of related field and expert from the nearby institutions. Besides the collection of plant



species, information was also collected with vernacular names of plant species made by local inhabitants. In this process the whole study area divided into different sections to get the maximum diversity of plant species. The sampling sites were selected based on landuse pattern, topography and floristic composition of the study area. The other relevant data on biodiversity, in the study area have been collected from secondary sources like forest and wildlife departments.

3.3.3 Study Area and its Major Habitat

3.3.3.1 Nahargarh WLS

Nahargarh Sanctuary spreading over 7.2 km² is about 3 km from Amer on Delhi highway. Apart of this sanctuary has been developed as a Biological Park in 1993 known as Nahargarh Biological Park with the sole objectives of Wild Life Conservation, Wildlife Education and Research. The Sanctuary has “Tropical Dry Deciduous Forest” and “Tropical Thorn Forest” as per Champion and Seth classification and the forest is spread over the area on various geological and soil formations and hilly terrain of Aravalis and hence varies in composition.

Sanctuary is rich in Flora. 85 species of trees, 19 species of shrubs, 29 species of climbers and 20 species of grasses are found in tropical dry deciduous and tropical thron forests. Anogeissus is the key stone species of the forest because of which hill changes color from green (rainy season) to ash color in winter because of change in color of its leaves. Three water bodies in the park had 9 species of hydrophytes. Platforms may be constructed in the water boides for limited fishing by tourists. To ensure fish availability in not competing way to waterfowls (resident and migratory) and tourists, Forest Department may liaison with the State Fishery Department for introduction of fish fingerlings in the rainy season.

The good vegetation cover supports rich wildlife. Thirty-three species of mammals are found in the sanctuary, panther being the most beautiful animal amongst them. Other species are Blue Bull, Hyena, Porcupine, Jackal, Fox, Jungle Cat, Desert Cat, Civet and Mongoose. The park is also rich in reptiles and amphibious animals sighted commonly near Ramsagar. There are 22 species of insects, 7 species of butterflies and 10 species fish.



Herbivores face competition with cattle from surrounding village. Stage Forest Department should promote Joint Forestry Program on the Gochar land/community land of the villages for which funds are available in State Government Scheme. This will increase availability of fodder and fuel wood that would lessen pressure on the Sanctuary and strengthen food web of the Sanctuary.

The park is rich in avifauna having 281 species. The migratory birds are the major attraction during winter in Ram Sagar Dam and few important ones are; Large Cormorant, Grey Leg-Geese, Pin Tail and Teals. The surrounding forests are visited by Golden Back, Wood-Pecker and Indian Pitta etc.

The resident birds are equally important. White Napped Tit is sighted rarely in the park whereas Peacock, Black-Partridge, Short Eared Owl, Grey Hornbill, Tree-Pie and Falcons are mostly sighted. State Forest Department should construct bird watching towers to promote bird watching without disturbance.

3.3.3.2 Eco-sensitive zones (ESZs)

1. Eco-sensitive zone (ESZs) or Ecologically Fragile Areas (EFAs) are area notified by the MoEFCC around Protected Area, National Parks and Wildlife Sanctuaries.
2. The purpose of declaring ESZs is to create some kind of “shock absorbers” to the protected areas by regulating and managing the activities around such areas.
3. The also act as a transition zone from area of high protection to areas involving lesser protection.
4. The Environment (Protection) Act, 1986 does not mention the word “Eco-Sensitive Zones”.
5. An ESZ could go up to 10 kilometers around a protected area as provided in the Wildlife Conservation Strategy, 2002.
6. Moreover, n the case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape lineage, are beyond 10 km width, these should be included in the ESZs.

3.3.3.3 ESZ Nahargarh Wildlife Sanctuary

Nahargarh Wildlife Sanctuary is lying between latitude 26°56'15.08" N & 26°57'5.81" N and longitudes 75°48'55.70" E & 75°46'54.65" E. The Sanctuary was notified vide Government of Rajasthan notification no. F11 (39) Revenue/8/80 of dated



the 22nd September, 1980. The sanctuary is situated in the Aravalli ranges at Amber hill, Jaipur district of Rajasthan and is spread over an area of 52.40 square kilometers. The sanctuary has “Tropical Dry Deciduous Forest” and “Tropical Thorn Forest” as per classification of Champion and Seth. The forest is spread over the area on various geological and soil formations over the hilly terrain of Aravalli and hence varies in composition. The Wildlife Sanctuary has a variety of habitats for diversified flora and major flora of this sanctuary includes Salar (*Boswellia serrata*), Gurjon (*Lannea grandis*), Tendu (*Dispyros melanoxylon*), Karaya (*Sterculia urens*), Gugal (*Commiphora wightii*), Amaltas (*Cassia fistula*), Awanla (*Phyllanthus emblica*), Humb (*Miliusa tomentosa*), Goya Khir (*Dichrostachys cinerea*), Sahjan (*Maringa pterygosperma*), Palas (*Butea monosperma*), Indian redwood (*Soydmda febriguga*), Mokha (*Scherebra swetenoides*), Rohini (*Mallatus philipnensis*), Ber (*Zizphus jujuba*), Jamun (*Syzyguim cumini*), Gular (*Ficus glomerata*), Kaim (*Mitragyna parvifolia*), Bahida (*Terminalia bellerica*), Dhaora (*Anogeissus latifolia*), Kahjur (*Phoenix sylvestris*), Hingot (*Balanites aegyptica*), Khair (*Acacia catechu*), Sevan (*Gmelia arborea*), Arjun (*Terminalia arjuna*), Neem (*Azadirachta indica*), Peepal (*Ficus religiosa*), Bargad (*Ficus benghalensis*), Shisham (*Dalbergia sissoo*), Bija Sal (*Pterocarpus marsupium*), Indian plum (*Flacourita indica*), Sweet Indrajao (*Wrightia tinctoria*), Dudhi (*Wrightia tomentosa*), Jjhinhori Bidi Ptta (*Bauhinia recemosa*), Toothed Leaf Chilla (*Casaeria tomentosa*), Sacred Garlic Pear or Temple plant (*Creataeva relegiosa*), Bel (*Aegle marmelose*), Ronj (*Acacia marmelose*), Lisora (*Cordia myxa*), Churel (*Holoptelia intergrifoila*), Aam (*Mangifera indica*), Imli (*Tamarindus indica*), Kaith (*Limonia acidissima*), Siris (*Albizzia lebbek*), Semal (*Bombaz ceriba*), Black Oil Plant (*Cleastruspaniculates*), etc.

The Sanctuary has variety of habitats for diversified fauna. Fish species recorded from of this Sanctuary includes Asian Carp (*Catla catla*), Bullseye Snakehead (*Channa marulius*), Lanchi (*Wallago attu*), Mahseer (*Tor tor*), Mirgal (*Cirrhinus cirrhosus*), Rohu (*Labeo rohita*), Spotted Snakehead (*Channa punctatus*), Giant River-Catfish (*Mystus seenghala*). Apart from fishes, the common Indian Toad (*Duttaphrynus melanostictus*), Common Frog (*Rana temporaria*), Banded Krait (*Bugorus fasciatus*), Cobra (*Naja naja*), Common Krait (*Bungarus caeruleus*), Indian Python (*Python molurus*), Indian Flapshell Turtle (*Lissemys punctata*), Rat Snake (*Ptyas mucosus*), Leopard (*Panthera pardus*), etc.





Figure No.: 3.1 Photographs showing different habitat in the Eco sensitive zone of Nahargarh Wildlife Sanctuary

Observation:



Figure No.: 3.2 Photographs showing survey were conducted for ESZ Nahargarh WLS

Table: 3.2 List of floral species recorded/compiled in the Nahargarh ESZ

Tree			
S. No.	Family	Scientific Name	Local Name
1	Fabaceae	A. catchu	Khair
2	Fabaceae	A. nilotica	Babool
3	Fabaceae	A. tortilis	Israeli Babool
4	Rubiaceae	Aegle marmelos	Bel
5	Simaroubaceae	Ailanthus excelsa	Ardu
6	Fabaceae	Albizia lebbeck	Siris
7	Fabaceae	Albizia Procera	Kala Siris
8	Meliaceae	Azadirachta indica	Neem
9	Fabaceae	Cassia siamea	Khasod
10	Fabaceae	Cassia fistula	Amaltash
11	Fabaceae	Dalbergia sissoo	Shisham
12	Moraceae	Ficus benghalensis	Bargad
13	Moraceae	Ficus religiosa	Peepal
14	Salicaceae	Flacourita indica	Indian plum
15	Anacardiaceae	Mangifera indica	Aam
16	Celastraceae	Maytenus emarginata	Kankeda, Kakcda
17	Meliaceae	Melia azedarach	Bakayan
18	Rubiaceae	Mitragyna parvifolia	Kalam, Kndam
19	Moringaceae	Moringa oleifera	Sahjan
20	Fabaceae	P. Juliflora	Vilayati Babool
21	Arecaceae	Phoenix sylvestris	Khajur
22	Phyllanthaceae	Phyllanthus emblica	Awanla
23	Fabaceae	Pongamia pinnata	Karanj
24	Fabaceae	Prosopis cineraria	Khejri
25	Annonaceae	Polyalthia longifolia	Ashok

*Source-Listing supported by Forest department Jaipur, Rajasthan

Table: 3.3 List of shrubs recorded/compiled in the Nahargarh ESZ

Shrubs			
S. No.	Family	Scientific Name	Local Name
1	Malvaceae	Sida cordifolia	Kharenti
2	Rhamnaceae	Ziziphus nummularia	Jhad beri
3	Fabaceae	Acacia jacquemontii	Bamuli, Baonli
4	Fabaceae	Crotalaria burhia	Sinia
5	Papilionaceae	Tephrosia purpurea	Jhojaroo
6	Cactaceae	Opuntia elatior	Nag-Phani
7	Apocynaceae	Nerium oleander	Kancer
8	Apocynaceae	Thevetia peruviana	Pili-Kancer
9	Apocynaceae	Leptadenia pyrotechnica	Khinp



10	Convolvulaceae	Ipomoea fistulosa	Besharam behaya
11	Solanaceae	Datura innoxia	Dhalura
12	Martyniaceae	Martynia annua	Bagh-nakhi
13	Verbenaceae	Lantana camara	Raimuniya
14	Nyctaginaceae	Bougainvillea spectabilis	Booganbel
15	Poaceae	Dendrocalamus strictus	Bans
16	Apocynaceae	Calotropis procera	Aak
17	Capparaceae	Capparis decidua	Ker

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.4 List of Climbers recorded/compiled in the Nahargarh ESZ

Climbers			
S. No.	Family	Scientific	Local Name
1	Menispermaceae	Tinospora cordifolia	Giloy
2	Sapidaceae	Cardiospermum halicacabum	Balloon Vine
3	Fabaceae	Abrus precatorius	Chirmi, Rati
4	Fabaceae	Rhynchosia minima	Least snout-bean
5	Cucurbitaceae	Citrullus colocynthis	Gartoomba
6	Cucurbitaceae	Coccuna cordifolia	Gulkakri, Kundroo
7	Cucurbitaceae	Momordica dioica	Kakora, Kikora
8	Apocynaceae	Ceropegia bulbosa	Hedulo
9	Apocynaceae	Pergularia daemia	Trellis-vine

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.5 List of Herbs recorded/compiled in the Nahargarh ESZ

Herbs			
S. No.	Scientific Name	Local Name	Family
1	Argemone mexicana	Pili Kateri	Papaveraceae
2	Cleome gynandra	Jakhiya or hurhur	Cleomaceae
3	Abutilon bidentatum	Atibala/ kanghee	Malvaceae
4	Hibiscus lobatus	Javakusum	Malvaceae
5	Tribulus terrestris	Chota Gokhru	Zygophyllaceae
6	Cassia tora	Chakaund	Fabaceae
7	Bidens biternata	Chirchitta	Asteraceae
8	Echinops echinatus	Unthkanta	Asteraceae
9	Verbesina encelioides	Jangli-genda	Asteraceae
10	Vernonia cinerea	Sahdevi	Asteraceae
11	Xanthium indicum	Billi	Asteraceae
12	Launaea sarmentosa	Unt-Santi	Asteraceae
13	Tridax procumbens	Kanphuli	Asteraceae
14	Enicostema verticillatum	Nahi, Nami	Gentianaceae
15	Convolvulus microphyllus	Shankh Pushpi	Convolvulaceae
16	Evolvulus alsinoides	Visnukrantha	Convolvulaceae



17	<i>Solanum nigrum</i>	Kasar-Kateli	Solanaceae
18	<i>S. surattense</i>	Choti Kateri	Solanaceae
19	<i>Bacopa monnieri</i>	Brahmi	Plantaginaceae
20	<i>Ocimum canum</i>	Nagad-Baoji	Lamiaceae
21	<i>Boerhavia diffusa</i>	Santi	Nyctaginaceae
22	<i>Aerva lanata</i>	Chhaya	Amaranthaceae
23	<i>A. tomentosa</i>	Bui	Amaranthaceae
24	<i>Achyranthes aspera</i>	Chirchita	Amaranthaceae
25	<i>Amaranthus spinosus</i>	Choulai	Amaranthaceae
26	<i>Celosia argentea</i>	Siryai	Amaranthaceae
27	<i>Chenopodium album</i>	Bathua	Amaranthaceae
28	<i>Acalypha indica</i>	Kuppi	Euphorbiaceae
29	<i>Euphorbia hirta</i>	Bada dudhi	Euphorbiaceae
30	<i>Phyllanthus simplex</i>	Bhuiamla	Phyllanthaceae
31	<i>Aloe vera</i>	Gwar-patha	Asphodelaceae
32	<i>Asphodelus tenuifolius</i>	Pyaja	Asphodelaceae
33	<i>C. rotundus</i>	Nagarmotha	Cyperaceae
34	<i>C. triceps</i>	-	Cyperaceae
35	<i>Apluda mutica</i>	Tachula	Poaceae
36	<i>Aristida adscensionis</i>	Lappa	Poaceae
37	<i>Cenchrus biflorus</i>	Bhurat	Poaceae
38	<i>Cyndon dactylon</i>	Bermuda grass	Poaceae
39	<i>Echinochloa colonum</i>	Jungle rice	Poaceae
40	<i>Saccharum bengalense</i>	Haadol	Poaceae
41	<i>S. spontaneum</i>	Wild Sugarcane,	Poaceae

*Source-Listing supported by Forest department Jaipur, Rajasthan

Table: 3.6 List of faunal species recorded/compiled in the Nahargarh WLS

S. No.	Scientific name	Common Name	Family	IWPA, 1972	IUCN, Status
1	<i>Elanus caeruleus</i>	Black winged Kite	Accipitridae	III	LC
2	<i>Accipiter badius</i>	Shikra	Accipitridae	I	LC
3	<i>Pavo cristatus</i>	Indian peafowl	Phasianidae	I	LC
4	<i>Mirafra erythroptera</i>	Bush Lark	Alaudidae	IV	LC
5	<i>Mirafra assamica</i>	Bengal Bush Lark	Alaudidae	IV	LC
6	<i>Galerida cristata</i>	Crested Lark	Alaudidae	IV	LC
7	<i>Eremopterix griseus</i>	Ashy-crowned sparrow-lark	Alaudidae	IV	LC
8	<i>Anas poecilorhyncha</i>	Spot billed Duck	Anatidae	IV	LC
9	<i>Anas platyrhynchos</i>	Mallard	Anatidae	IV	LC
10	<i>Bubulcus ibis</i>	Cattle Egret	Ardeidae	IV	LC



11	Dendrocitta vagabunda	Indian Tree Pie	Corvidae	IV	LC
12	Coracias garrulus	European Roller	Coraciidae	IV	LC
13	Coracias benghalensis	Indian Roller	Coraciidae	IV	LC
14	Corvus splendens	House Crow	Corvidae	IV	LC
15	Dicrurus adsimilis	Black Drongo	Dicruridae	IV	LC
16	Falco tinnunculus	Common Kestrel	Falconidae	IV	LC
17	Riparia riparia	Sand Martin	Hirundinidae	IV	LC
18	Riparia paludicola	Brown throated martin	Hirundinidae	IV	LC
19	Hirundo concolor	Dusky Crag Martin	Hirundinidae	IV	LC
20	Hirundo smithii	Wire-tailed Swallow	Hirundinidae	IV	LC
21	Lanius excubitor	Grey Shrike	Laniidae	IV	LC
22	Lanius vittatus	Bay backed Shrike	Laniidae	IV	LC
23	Merops persicus	Green Bee-Eater	Meropidae	IV	LC
24	Motacilla Flava	Yellow headed Wagtail	Motacillidae	IV	LC
25	Motacilla cinerea	Grey Wagtail	Motacillidae	IV	LC
26	Chrysomma sinense	Yellow-eyed Babbler	Paradoxornithidae	IV	LC
27	Copsychus saularis	Oriental magpie-robin	Muscicapidae	IV	LC
28	Phoenicurus ochruros	Black Redstart	Muscicapidae	IV	LC
29	Cercomela fusca	Brown Rock Chat	Muscicapidae	IV	LC
30	Saxicola caprata	Pied Bush Chat	Muscicapidae	IV	LC
31	Saxicoloides fulicata	Indian Robin	Muscicapidae	IV	LC
32	Turdoides striata	Jungle Babbler	Leiothrichidae	IV	LC
33	Francolinus pondicerianus	Grey francolin	Phasianidae	IV	LC
34	Francolinus francolinus	Black Francolin	Phasianidae	IV	LC
35	Alcedo atthis	Common Kingfisher	Alcedinidae	IV	LC
36	Halcyon smyrnensis	White breasted Kingfisher	Alcedinidae	IV	LC
37	Microcarbo niger	Little Cormorant	Phalacrocoracidae	IV	LC
38	Pycnonotus leucotis	White-checked Bulbul	Pycnonotidae	IV	LC
39	Pycnonotus cafer	Red vented Bulbul	Pycnonotidae	IV	LC
40	Acridotheres ginginianus	Bank Myna	Sturnidae	V	LC
41	Sturnus pagodarum	Brahminy Myna	Sturnidae	IV	LC
42	Pastor roseus	Rosy Starling	Sturnidae	IV	LC
43	Gracupica contra	Pied Myna	Sturnidae	IV	LC
44	Acridotheres tristis	Common Myna	Sturnidae	IV	LC
45	Pseudibis papillosa	Red Naped Ibis	Threskiornithidae	IV	LC
46	Upupa epops	Eurasian Hoopoe	Upupidae	IV	LC

**Source-Listing supported by Forest department Jaipur, Rajasthan*



Table: 3.7 List of reptiles recorded/compiled in the Nahargarh ESZ

Reptiles					
S. No.	Scientific Name	Common Name	Family	IUCN Status	IWPA, 1972
1	Trionyx gangeticus	Ganges Softshell	Trionychidae	EN	I
2	Hemidactylus flaviviridis	Northern House gecko	Gekkonidae	-	III
3	Hemidactylus triedrus	Temite Gecko	Gekkonidae	-	-
4	Hemidactylus brookii	Brook's Gecko	Gekkonidae	-	-
5	Calotes versicolor	Common Garden Lizard	Agamidae	LC	
6	Eryx johnii	Sand Boa	Boidae	NT	IV
7	Fowlea piscator	Checkered Keelback	Colubridae	LC	IV
8	Naja naja	Indian Cobra	Elaphidae	VU	II
9	Echis carinatus	Saw-scaled Viper	Viperidae	-	IV

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.8 List of Mammals recorded/compiled in the Nahargarh ESZ

Mammals					
S. No.	Scientific Name	Common Name	Family	IUCN Status	IWPA, 1972
1	Macaca mulatta	Rhesus macaque	Cercopithecidae	LC	V
2	Semnopithecus entellus	Grey Langur	Cercopithecidae	LC	II
3	Panthera pardus	Panther, Leopard	Felidae	VU	I
4	Herpestes edwardsi	Common mongoose	Herpestidae	LC	IV
5	Herpestes smithii	Ruddy mongoose	Herpestidae	LC	IV
6	Vulpes bengalensis	Indian Fox	Canidae	LC	II

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.9 List of Amphibians recorded/compiled in the Nahargarh ESZ

Amphibians					
S. No.	Scientific Name	Common Name	Family	IUCN Status	IWPA, 1972
1	Hoplobatrachus tigerinus	Indian Bull Frog	Dicroglossidae	-	IV
2	Duttaphrynus melanostictus	Common Indian toad	Bufonidae		
3	Acris crepitans	Cricket Frog	Hylidae	LC	IV
4	Euphlyctis cyanophlyctis	Skipping Frog	Dicroglossidae	LC	IV
5	Rana temporaria	Common frog	Ranidae		



Table: 3.10 List of Fish recorded/compiled in the Nahargarh ESZ

Fish				
S. No.	Scientific Name	Common name	Family	IUCN, Status
1	Catla catla	Asian carp	Channidae	NT
2	Labeo rohita	Rohu	Cyprinidae	LC

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.11 List of Butterfly recorded/compiled in the Nahargarh ESZ

Butterfly				
S. No.	Scientific name	Local name	Family	IUCN Status
1	Lampides boeticus	Pea blue	Lycaenidae	LC
2	Papilio demoleus	Lime butterfly	Papilionidae	NA
3	Danaus genutia	Striped Tiger	Nymphalidae	NA
4	Belenois aurota	The Pioneer White	Pieridae	LC
5	Junonia orithya	Blue Pansy	Nymphalidae	LC
6	Junonia hierta	Yellow Pansy	Nymphalidae	LC
7	Eurema hecabe	Common Grass yellow	Pieridae	LC
8	Eurema hecabe	Common grass yellow	Pieridae	LC

**Source-Listing supported by Forest department Jaipur, Rajasthan*

Table: 3.12 List of floral species recorded/compiled in the Nahargarh WLS

Tree			
S. No.	Family	Scientific Name of Plant	Local Name
1	Fabaceae	A. Catchu	Khair
2	Fabaceae	A. Ferruginca	Kaigar
3	Fabaceae	A. nilotica var cupressifurmis	Babool
4	Fabaceae	A. Senegal	Koomta, Khcri
5	Fabaceae	A. Tortilis	Israeli Babool
6	Fabaceae	Acacia leucophloea	Ronjh
7	Fabaceae	Acacia mlonca	Babool
8	Rubiaceae	Adina cordifolia	Haldu
9	Rubiaceae	Aegle marmelos	Bel
10	Simaroubaceae	Ailanthus excelsa	Ardu
11	Fabaceae	Albizia lebbeck	Siris
12	Apocynaceae	Alstonia Scholaris	-
13	Combretaceae	Anogeissus pendula	Dhank
14	Meliaceae	Azadirachta indica	Neem
15	Zygophyllaceae	Balanites aegyptiaca	Hingot, Hingora
16	Fabaceae	Bauhinia racemosa	Jhhyha
17	Burseraceae	Boswellia serrata	Salar
18	Fabaceae	Butea monosperma	Dhak



19	B Boraginaceae	Cordia gharaf	Goondee
20	Fabaceae	Cassia siamea	-
21	Fabaceae	Cassia Fistula	Amaltash
22	Burseraceae	Commiphora wightii	Gugal
23	Boraginaceae	Cordia dichotoma	Lishora
24	Acanthaceae	D. Paniculata	-
25	Fabaceae	Dalbergia sissoo	Shisham
26	Fabaceae	Dichrostachys cinerea	Goya Khair
27	Salicaceae	Flacourtia indica	-
28	Moraceae	Ficus Benghalensis	Bargad
29	Moraceae	Ficus religiosa	Peepal
30	Apocynaceae	Hudsonia tomentosa	-
31	Apocynaceae	Wrightia tinctoria	Khirm
32	Anacardiaceae	Lannea coromandelica	Gurjan
33	Anacardiaceae	Mangifera indica	Aam
34	Celastraceae	Maytenus emarginata	Kankeda, Kakda
35	Meliaceae	Melia azedarach	Bakayan
36	Rubiaceae	Mitragyna parvifolia	Kalam, Kndam
37	Moringaceae	Moringa Oleifera	Sahinjano
38	Fabaceae	P. Juliflora	Vilayati Babool
39	Fabaceae	Parkinsonia aculeata	-
40	Arecaceae	Phoenix sylvestris	Khajur
41	Fabaceae	Pongamia pinnata	Karanj
42	Fabaceae	Prosopis cineraria	Khejri
43	Annonaceae	Polyalthia longifolia	Ashok
44	Salvadoraceae	Salvadora persica	Peelu
45	Sapindaceae	Sapindus emarginatus	Areetha
46	Malvaceae	Sterculia urens	Kadaya
47	Fabaceae	Tamarindus indica	Imali
48	Rhamnaceae	Ziziphus mauritiana	Beri, Bordi

Source-Listing supported by Forest department Jaipur, Rajasthan.

Table: 3.13 List of shrubs recorded/compiled in the Nahargarh WLS

Shrubs			
S. No.	Family	Scientific Name	Local Name
1	Annonaceae	Annona squamosa	Sitaphal
2	Capparaceae	Capparis sepiaria	Jaal. Heens
3	Malvaceae	Sida cordifolia	Kharenti
4	Malvaceae	Waltheria indica	-
5	Tiliaceae	Grewia damine	-
6	Malvaceae	Grewia flavescens	-
7	Malvaceae	Grewia tenax	Gangeran
8	Rhamnaceae	Ziziphus nummularia	Jhadi-Ber
9	Sapindaceae	Dodonaea viscosa	Relia



10	Anacardiaceae	Rhus mysorensis	Dansra
11	Caesalpiniaceae	Cassia occidentalis	-
12	Fabaceae	Acacia jacquemontii	Bamuli, Baonli
13	Fabaceae	Crotalaria burhia	Sinia
14	Papilionaccae	Tephrosia purpurea	Jhojaroo
16	Cactaceae	Opuntia elatior	Nag-Phani
17	Plumbaginaceae	Dyerophytum indicum	-
18	Plumbaginaceae	Vogelia indica	Chitrak
19	Plumbaginaceae	Plumbago zeylanica	-
20	Apocynaceae	Nerium oleander	Kancer
21	Apocynaceae	Thevetia peruviana	Pili-Kancer
22	Apocynaceae	Leptadenia pyrotechnica	Kheenp
23	Apocynaceae	Sarcostemma acidum	-
24	Convolvulaceae	Ipomoea fistulosa	Vilayati-Ak
25	Solanaceae	Datura innoxia	Dhalura
26	Solanaceae	Lycium barbarum	Ashawagandha
27	Solanaccae	Withania somnifera	-
28	Martyniaceae	Martynia annua	Bagh-nakhi
29	Acanthaceae	Adhatoda vasica	Adusa
30	Acanthaceae	Berleia prionitis	Vijradanti
31	Lamiaceae	Vitex negundo	-
32	Verbenaceae	Lantana indica	Be-Sharm
33	Euphorbiaceae	Euphorbia neriifolia	Danda-thor
34	Euphorbiaceae	Securinega leucopyrus	-
35	Nyctaginaceae	Bougainvillea spectabilis	-
36	Asparagaceae	Agave vivipara	Rambans
37	Pandanaceae	Pandanus fascicularis	Koera
38	Poaceae	Dendrocalamus strictus	Bans
39	Apocynaceae	Calotropis procera	Aak
40	Capparaceae	Capparis decidua	Ker

Source: Listing supported by Forest department Jaipur, Rajasthan.

Table: 3.14 List of Herbal species recorded/compiled in the Nahargarh WLS

Herbs			
S. No.	Family	Scientific Name	Local Name
1.	Papaveraceae	Argemone mexicana	Pili Kateri
2.	Cleomaceae	Cleome gynandra	Jakhiya or hurhur
3.	Brassicaceae	Coronopus didymus	Pitpapra
4.	Brassicaceae	Sisymbrium irio	Khubkaln
5.	Malvaceae	Abutilon bidentatum	Atibala/ kanghee
6.	Malvaceae	Hibiscus lobatus	Javakusum
7.	Malvaceae	Corchorus aestuans l	Kaglahar
8.	Tiliaceae	Triumfelta rhomboidea	Chiriyari,
9.	Aizoaceae	T. pentandra	Nichardi
10.	Zygophyllaceae	Tribulus terrestris	Chota Gokhru



11.	Geraniaceae	Monsonia senegalensis	Varsharani
12.	Oxalidaceae	Oxalis corniculata	Changeri
13.	Fabaceae	Cassia tora	Chakaund
14.	Fabaceae	Alhagi pseudalhagi	Jawasa
15.	Fabaceae	Crotalaria medicaginea	Gulali
16.	Fabaceae	Desmodium gangeticum	Salparni
17.	Fabaceae	Alysicarpus longifolius	Jangali gailia
18.	Fabaceae	Phaseolus trilobus	-
19.	Aizoaceae	Trianthema portulacastrum	Santi
20.	Aizoaceae	Zaleya govindia	-
21.	Asteraceae	Acanthospermum hispidum	-
22.	Asteraceae	Artemisia scoparia	Bannah
23.	Asteraceae	Bidens biternata	-
24.	Asteraceae	Echinops echinatus	-
25.	Asteraceae	Eclipta albo	-
26.	Asteraceae	Pulicarta crispa	-
27.	Asteraceae	Oligochacta ramosa	Unt-Katela
28.	Asteraceae	Verbesina encelioides	Jangli-genda
29.	Asteraceae	Vernonia cinerea	Sahdevi
30.	Asteraceae	Xanthium indicum	Billi
31.	Asteraceae	Launaea sarmentosa	Unt-Santi
32.	Asteraceae	Tridax procumbens	-
33.	Primulaceae	Anagallis arvensis	-
34.	Apocynaceae	Catharanthus pusillus	-
35.	Apocynaceae	C. roseus	Sadabahar
36.	Gentianaceae	Enicostema verticillatum	Nahi, Nami
37.	Boraginaceae	Arnebia hispidissima	Ralanjyot
38.	Boraginaceae	Heliotropium marifoliwn	-
39.	Boraginaceae	H. ovalifolium	-
40.	Convolvulaceae	Convolvulus microphyllus	-
41.	Convolvulaceae	Evolvulus alsinoides	-
42.	Solanaceae	Physalis minima	Charpotan
43.	Solanaceae	Solanum nigrum	Kasar-Kateli
44.	Solanaceae	S. Surattense	-
45.	Plantaginaceae	Bacopa monnieri	Brahmi
46.	Plantaginaceae	Lindenbergia muraria	-
47.	Pedaliaceae	Pedaliium murex	Gokhru
48.	Pedaliaceae	Sesamum indicum	Til
49.	Acanthaceae	Justicia trinervia	-
50.	Acanthaceae	Lepidagathis cristata	-
51.	Acanthaceae	Indoneexiclla cchioides	-
52.	Acanthaceae	Peristrophe bicatyculata	-
53.	Lamiaceae	Leucas aspera	-
54.	Lamiaceae	Ocimum canum	Nagad-Baoji
55.	Nyctaginaceae	Boerhavia diffusa	Santi
56.	Amaranthaceae	Aerva lanata	-



57.	Amaranthaceae	A. tomentosa	Bui
58.	Amaranthaceae	Achyranthes aspera	Chirchita
59.	Amaranthaceae	Amaranthus spinosus	Choulai
60.	Amaranthaceae	Celosia argentea	Siryai
61.	Amaranthaceae	Pupalia lappacea	-
62.	Amaranthaceae	Digera muricata	Luswa
63.	Amaranthaceae	Chenopodium album	Bathua
64.	Amaranthaceae	Chenopodiastrum murale	-
65.	Polygonaceae	Polygonum plebeium	-
66.	Polygonaceae	P. barbatum	-
67.	Polygonaceae	P. galbrum	-
68.	Polygonaceae	Rumex dentatus	-
69.	Euphorbiaceae	Acalypha indica	-
70.	Euphorbiaceae	Croton bonpandianwn	-
71.	Euphorbiaceae	Euphorbia hirta	-
72.	Euphorbiaceae	E. prostrata	-
73.	Phyllanthaceae	Phyllanthus simplex	-
74.	Phyllanthaceae	P. niruri	Bhui-Anwala
75.	Asphodelaceae	Aloe vera	Gwar-patha
76.	Asphodelaceae	Asphodelus tenuifolius	Pyaja
77.	Commelinaceae	Commelina benghalensis	-
78.	Commelinaceae	C. forskalaei	-
79.	Cyperaceae	Cyperus bulbosus	-
80.	Cyperaceae	C. compressus	-
81.	Cyperaceae	C. rotundus	-
82.	Cyperaceae	C. triceps	-
83.	Cyperaceae	Fimbristylis dichotoma	-
84.	Poaceae	Apluda mutica	-
85.	Poaceae	Aristida adscensionis	-
86.	Poaceae	Arundo donax	-
87.	Poaceae	Cenchrus biflorus	-
88.	Poaceae	Anacanthus barbatus	-
89.	Poaceae	Cyndon dactylon	-
90.	Poaceae	Doctylocteniuni aegyptium	-
91.	Poaceae	Echinochloa colonum	-
92.	Poaceae	Phragmites karka	-
93.	Poaceae	Saccharum bengalense	-
94.	Poaceae	S. spontaneum	-
95.	Poaceae	Sorghum helepense	-

Source: Listing supported by Forest department Jaipur, Rajasthan.

Table: 3.15 List of Climbers recorded/compiled in the Nahargarh WLS

Climbers			
S. No.	Family	Scientific	Local Name
1.	Menispermaceae	Tinospora cordifolia	Giloy



2.	Menispermaceae	Cissampelos pareira	velvetleaf
3.	Violaceae	Viola cinerea	Stocks Violet
4.	Vitaceae	Ampelocissus latifolia	Wild Grape
5.	Vitaceae	Causonis trifolia	-
6.	Sapindaceae	Cardiospermum halicacabum	-
7.	Fabaceae	Abrus precatorius	Chirmi, Rati
8.	Fabaceae	Rhynchosia minima	-
9.	Cucurbitaceae	Citrullus colocynthis	Gartoomba
10.	Cucurbitaceae	Coccuna cordifolia	Gulkakri, Kundroo
11.	Cucurbitaceae	Luffa acutangula	Torai
12.	Cucurbitaceae	Momordica balsamina	Karela
13.	Cucurbitaceae	Momordica Charantia	Karela
14.	Cucurbitaceae	Momordica dioica	Kakora, Kikora
15.	Cucurbitaceae	Cucumis maderaspatanus	-
16.	Cucurbitaceae	Diplocyclos palmatus	-
17.	Cucurbitaceae	Cucumis melo	Kachari/ melon
18.	Cucurbitaceae	Cucumis Prophetarum	-
19.	Apocynaceae	Ceropegia Attenuata	Khadula
20.	Apocynaceae	Ceropegia bulbosa	-
21.	Apocynaceae	Pergularia daemia	-
22.	Convolvulaceae	Ipomoea nil	Japanese morning glory
23.	Convolvulaceae	Ipomoea Pestigridis	Ipomoea pes-tigridis
24.	Convolvulaceae	Rivea hypocrateriformis	Midnapore Creeper
25.	Convolvulaceae	Rivea Ornata	-
26.	Polygonaceae	Antigonon leptopus	Mexican creeper

Source: Listing supported by Forest department Jaipur, Rajasthan

Table: 3.16 List of Aquatic Plants recorded/compiled in the Nahargarh WLS

Aquatic plants			
S. No.	Family	Scientific Name	Local Name
1.	Hydrocharitaceae	Hydrilla verticillata	-
2.	Hydrocharitaceae	Vallisneria spiralis	-
3.	Pontederiaceae	Eichhornia crassipes	Jalkumbhi
4.	Typhaceae	Typha angustata	Patera
5.	Typhaceae	Typha elephantina	Bulrushes
6.	Potamogetonaceae	Potamogeton crispus	curly-leaf pondweed
7.	Araceae	Lemna perpusilla	duckweed
8.	Araceae	Spirodela polyrhiza	Common Duckmeat
9.	Araceae	Wolffia arrhiza	spotless watermeal



Table: 3.17 List of faunal species recorded/compiled in the Nahargarh WLS

S. No.	Scientific name	Common English Name	Family	IWP A,1972	IUCN, Status
1.	Elanus caeruleus	Black winged Kite	Accipitridae	III	LC
2.	Milvus migrans	black Kite	Accipitridae	III	LC
3.	Haliastur indus	Brahminy Kite	Accipitridae	III	LC
4.	Accipiter badius	Shikra	Accipitridae	III	LC
5.	Aquila pomarina	Lesser-spotted Eagle	Accipitridae	III	LC
6.	Gyps bengalensis	White rumped vulture	Accipitridae	I	CR
7.	Pavo cristatus	Indian peafowl	Phasianidae	I	LC
8.	Gyps indicus	Long billed Vulture	Accipitridae	I	CR
9.	Sarcogyps calvus	Red-headed vulture	Accipitridae	I	CR
10.	Neophron percnopterus	Egyptian Vulture	Accipitridae	III	EN
11.	Circaetus gallicus	Short-toed snake Eagle	Accipitridae	III	LC
12.	Circus aeruginosus	Marsh Harrier	Accipitridae	III	LC
13.	Mirafra erythroptera	Bush Lark	Alaudidae	IV	LC
14.	Mirafra assamica	Bengal Bush Lark	Alaudidae	IV	LC
15.	Calandrella brachydactyla	Short-toed Lark	Alaudidae	IV	LC
16.	Galerida cristata	Crested Lark	Alaudidae	IV	LC
17.	Eremopterix griseus	Ashy-crowned sparrow-lark	Alaudidae	IV	LC
18.	Tadorna ferruginea	Ruddy Shelduck	Anatidae	IV	LC
19.	Anas acuta	Northern pintail	Anatidae	IV	LC
20.	Anas crecca	Common Teal	Anatidae	IV	LC
21.	Anas poecilorhyncha	Spot billed Duck	Anatidae	IV	LC
22.	Anas platyrhynchos	Mallard	Anatidae	IV	LC
23.	Mareca strepera	Gadwall	Anatidae	IV	LC
24.	Spatula clypeata	Northern shoveler	Anatidae	IV	LC
25.	Netta rufina	Red crested Pochard	Anatidae	IV	LC
26.	Aythya ferina	Common Pochard	Anatidae	IV	LC
27.	Aythya nyroca	White-eyed Pochard	Anatidae	IV	LC
28.	Aythya fuligula	Tufted Duck	Anatidae	IV	LC

29.	Nettapus coromandelianus	Cotton Teal	Anatidae	IV	LC
30.	Ardea cinerea	Grey Heron	Ardeidae	IV	LC
31.	Ardea purpurea	Purple Heron	Ardeidae	IV	LC
32.	Ardeola grayii	Indian pond heron	Ardeidae	IV	LC
33.	Bubulcus ibis	Cattle Egret	Ardeidae	IV	LC
34.	Ardea alba	Large Egret	Ardeidae	IV	LC
35.	Egretta intermedia	Intermediate egret	Ardeidae	IV	LC
36.	Egretta garzetta	Little egret	Ardeidae	IV	LC
37.	Nycticorax nycticorax	Night Heron	Ardeidae	IV	LC
38.	Ocyrops birostris	Common Grey Hornbill	Bucerotidae	IV	LC
39.	Psilopogon zeylanicus	Large Green Barbet	Megalaimidae	IV	LC
40.	Psilopogon haemacephalus	Coppersmith barbet	Megalaimidae	IV	LC
41.	Dendrocitta vagabunda	Indian Tree Pie	Corvidae	IV	LC
42.	Mycteria leucocephala	Painted Stork	Ciconiidae	IV	LC
43.	Anastomus oscitans	Openbill Stork	Ciconiidae	IV	LC
44.	Ciconia episcopus	White-necked Stork	Ciconiidae	IV	LC
45.	Tephrodornis pondicerianus	Common woodshrike	Vangidae	IV	LC
46.	Coracina macei	Large Cuckoo-shrike	Campephagidae	IV	LC
47.	Coracina melanoptera	Black-headed -shrike	Campephagidae	IV	LC
48.	Pericrocotus cinnamomeus	Small minivet	Campephagidae	IV	LC
49.	Pericrocotus ethologus	White bellied Minivet	Campephagidae	IV	LC
50.	Pericrocotus speciosus	Scarlet Minivet	Campephagidae	IV	LC
51.	Tephrodornis pondicerianus	Common WoodShrike	Vangidae	IV	LC
52.	Coracias garrulus	European Roller	Coraciidae	IV	LC
53.	C. Benglensis	Indian Roller	Coraciidae	IV	LC
54.	Corvus splendens	House Crow	Corvidae	IV	LC



55.	Dicrurus macrocercus	Black Drongo	Dicruridae	IV	LC
56.	Dicrurus caerulescens	White bellied Drongo	Dicruridae	IV	LC
57.	Dicrurus adsimilis	Black Drongo	Dicruridae	IV	LC
58.	D. caerulescens	White bellied Drongo	Dicruridae	IV	LC
59.	Falco tinnunculus	Kestrel	Falconidae	-	LC
60.	Riparia riparia	Plain Sand Martin	Hirundinidae	IV	LC
61.	Riparia paludicola	Sand Martin	Hirundinidae	IV	LC
62.	Hirundo concolor	Dusky Crag Martin	Hirundinidae	IV	LC
63.	H. Simithi	Wire-tailed Swallow	Hirundinidae	IV	LC
64.	H. daurica	Red-rumped Swallow	Hirundinidae	IV	LC
65.	Aegithina tithia	Common Iora	Aegithinidae	IV	LC
66.	Lanius excubitor	Grey Shrike	Laniidae	IV	LC
67.	L. vittatus	Bay backed Shrike	Laniidae	IV	LC
68.	L. Schach	Rufous backed Shrike	Laniidae	IV	LC
69.	Merops mupercellus	Blue-checked Bee-eater	Meropidae	IV	LC
70.	Merops persicus	Green Bee-Eater	Meropidae	IV	LC
71.	Motacilla flava	Yellow Wagtail	Motacillidae	IV	LC
72.	M. orientalis	Yellow headed Wagtail	Motacillidae	IV	LC
73.	Motacilla flava	Grey Wagtail	Motacillidae	IV	LC
74.	M. Maderaspatensis	Large Pied Wagtail	Motacillidae	IV	LC
75.	Anthus campestris	Tawny Pipit	Motacillidae	IV	LC
76.	A. Trivialis	Tree Pipit	Motacillidae	IV	LC
77.	A. Spinoletta	Water Pipit	Motacillidae	IV	LC
78.	Oriolus chinensis	Black-headed Oriole	Oriolidae	IV	LC
79.	Motacilla Flava	Yellow Wagtail	Motacillidae	IV	LC
80.	M. Citreola	Yellow headed Wagtail	Motacillidae	IV	LC
81.	M. cinerea	Grey Wagtail	Motacillidae	IV	LC
82.	M. maderaspatensis	Large Pied Wagtail	Motacillidae	IV	LC
83.	Anthus Campestris	Tawny Pipit	Motacillidae	IV	LC
84.	A. Trivialis	Tree Pipit	Motacillidae	IV	LC
85.	A. spinoletta	Water Pipit	Motacillidae	IV	LC
86.	Turdoides caudatus	Common Babbler	Leiothrichidae	IV	LC
87.	T. malcolmi	Large Grey Babbler	Leiothrichidae	IV	LC
88.	T. striatus	Jungle Babbler	Leiothrichidae	IV	LC
89.	Chrysomma sinense	Yellow-eyed Babbler	Paradoxornithidae	IV	LC



90.	Muscicapa tickelliac	Tickell's Blue Flycatcher	Muscicapidae	IV	LC
91.	Musctcapa Purva	Red breasted Flycatcher	Muscicapidae	IV	LC
92.	Rlupidura auriota	White-browed Flycatcher	Muscicapidae	IV	LC
93.	Cullicicupa ceytonensis	Grey headed Flycatcher	Muscicapidae	IV	LC
94.	Terpstphone paradist	Paradise Flycatcher	Muscicapidae	IV	LC
95.	Clsticala juncidis	Streaked Fantail Warbler	Cisticolidae	IV	LC
96.	Prinia subflovera	Plain Wren-warbler	Cisticolidae	IV	LC
97.	P. Socialis	Ashy Wren-warbler	Cisticolidae	IV	LC
98.	Orthotomus sutorius	Tailor Bird	Cisticolidae	IV	LC
99.	Sylvia curruca	Lesser Whitethroat	Sylviidae	IV	LC
100.	Phylloscopus collybita	Brown Leaf Warber	Phylloscopidae	IV	LC
101.	Erithacus svecica	Blue throat	Muscicapidae	IV	LC
102.	Erithacus collope	Ruby throat	Muscicapidae	IV	LC
103.	Copsychus saularis	Oriental magpie-robin	Muscicapidae	IV	LC
104.	Phoenicurus ochruros	Black Redstart	Muscicapidae	IV	LC
105.	Cercomela fusca	Brown Rock Chat	Muscicapidae	IV	LC
106.	Saxicola caprata	Pied Bush Chat	Muscicapidae	IV	LC
107.	Saxicoloides fulicata	Indian Robin	Muscicapidae	IV	LC
108.	Monticola solitarius	Blue Rock Thrush	Muscicapidae	IV	LC
109.	Turdoides caudatus	Common Babbler	Leiothrichidae	IV	LC
110.	T. malcolmi	Large Grey Babbler	Leiothrichidae	IV	LC
111.	T. striatus	Jungle Babbler	Leiothrichidae	IV	LC
112.	Monticola solitarius	Blue Rock Thrush	Muscicapidae	IV	LC
113.	Oriolus oriolus	Golden Oriole	Oriolidae	IV	LC
114.	Oriolus larvatus	Black-headed Oriole	Oriolidae	IV	LC
115.	Parus major	Grey Tit	Paridae	IV	LC
116.	Pelecanus onocrotalus	White Pelican	Pelecanidae	IV	LC
117.	Francolinus pondicerianus	Grey Partridge	Phasianidae	IV	LC
118.	F. francolinus	Black Partridge	Phasianidae	IV	LC
119.	Coturnix coturnix	Common (Grey) Quail	Phasianidae	IV	LC



120.	<i>Perdica asiatica</i>	Jungle Bush Quail	Phasianidae	IV	LC
121.	<i>Alcedo atthis</i>	Common Kingfisher	Alcedinidae	IV	LC
122.	<i>Halcyon smyrnensis</i>	White breasted Kingfisher	Alcedinidae	IV	LC
123.	<i>Phalacrocorax carbo</i>	Cormorant (large)	Phalacrocoracidae	IV	LC
124.	<i>M.niger</i>	Little commorant	Phatacrocoracidae	IV	LC
125.	<i>Anhinga rufa</i>	Darter	Phatacrocoracidae	IV	LC
126.	<i>Phoenicopterus roseus</i>	Greater flamingo	Phoenicopteridae	IV	LC
127.	<i>Jynx torquilla</i>	Eurasian wryneck	Picidae	IV	LC
128.	<i>Dinopium benghalense</i>	Lesser Golden backed	Picidae	IV	LC
129.	<i>Leiopicus mahrattensis</i>	Pied woodpecker	Picidae	IV	LC
130.	<i>Podiceps cristatus</i>	Great Crested Grebe	Podicipedidae	IV	LC
131.	<i>T. ruficollis</i>	Little Grebe	Podicipedidae	IV	LC
132.	<i>Putta brachyuru</i>	Indian Pitta	Putidac	IV	LC
133.	<i>Pycnonotus leucotis</i>	White-checked Bulbul	Pycnonotidae	IV	LC
134.	<i>Pycnonotus cafer</i>	Red vented Bulbul	Pycnonotidae	IV	LC
135.	<i>P. Leucogenys</i>	White-checked Bulbul	Pycnonotidae	IV	LC
136.	<i>A. ginginianus</i>	Bank Myna	Sturnidae	V	LC
137.	<i>Sturnus pagodarum</i>	Brahminy Myna	Sturnidae	IV	LC
138.	<i>S. Roseus</i>	Rosy Pastor	Sturnidae	IV	LC
139.	<i>Gracupica contra</i>	Pied Myna	Sturnidae	IV	LC
140.	<i>Acridotheres tristis</i>	Common Myna	Sturnidae	IV	LC
141.	<i>Threskiornis aethiopicus</i>	African sacred ibis	Threskiornithidae	IV	LC
142.	<i>Pseudibis papillosa</i>	Black Ibis	Threskiornithidae	IV	LC
143.	<i>Platalea leucorodia</i>	Spoonbill	Threskiornithidae	IV	LC
144.	<i>Upupa epops</i>	Hoopoe	Upupidae	IV	LC

Table: 3.18 List of reptiles recorded/compiled in the Nahargarh WLS

Reptiles					
S. No.	Family	Scientific Name	English Name	IUCN Status	IWPA, 1972
1.	Geoemydidae	<i>Lissemys punctata</i>	Indian flap shell	VU	I
2.	Trionychidae	<i>Trionyx gangeticus</i>	Ganges Softshell	EN	I
3.	Trionychidae	<i>Lissemys punctata</i>	Indian Mud Turtle	VU	I



4.	Testudmidae	Geochelone clegans	Starred Tortoise	VR	IV
5.	Gekkonidae	Hemidactylus flaviviridis	Northern House gecko	-	III
6.	Gekkonidae	Hemidactylus triedrus	Temite Gecko	-	-
7.	Gekkonidae	Hemidactylus brookii	Brook's Gecko	-	-
8.	Agamidae	Calotes versicolor	Common Garden Lizard	LC	
9.	Agamidae	Uromastix hardwickii	Spiny tailed lizard	EN	II
10.	Chamaeleonidae	Chamaeleon zeylanicus	Indian Chameleon	LC	II
11.	Scincidae	Eutropis carinata	keeled Indian mabuya	-	-
12.	Pyralidae	Mediavia dissimilis	-	-	-
13.	Scincidae	Eutropis macularia	bronze grass skink	-	-
14.	Scincidae	Riopa punctata	common dotted garden skink	-	-
15.	Scincidae	Ophiomorus tridactylus	three-toed snake skink	-	-
16.	Lacertidae	Ophisops jerdonii	Jordon's Sanak-eye	LC	-
17.	Varanidae	Varanus bengalensis	Indian Monitor lizard	NT	I
18.	Typhlopidae	Indotyphlops braminus	Blind Snake	LC	IV
19.	Boidae	Eryx conicus	Russel's Earth Boa	NT	IV
20.	Boidae	Eryx johnii	Sand Boa	NT	IV
21.	Pythonidae	Python molurus	Indian Python	NT	I
22.	Colubridae	Lycodon aulicus	Common Wolf Snake	-	II
23.	Colubridae	Fowlea piscator	Checkered Keelback	LC	IV
24.	Colubridae	Elaphe helena	Trinket Snake	LC	IV
25.	Colubridae	Ptyas mucosus	Common Rat snake	-	II
26.	Colubridae	Argyrogena ventromaculatus	Glossy-bellied Racer	-	IV
27.	Colubridae	Spalerosophis diadema	The royal snake	-	IV
28.	Colubridae	Boiga trigonata	Indian gamma snake	-	IV
29.	Elaphidae	Bungarus Caeruleus	Common Krait	-	IV
30.	Elaphidae	Naja naja	Indian Cobra	VU	II
31.	Viperidae	Echis carinatus	Saw-scaled Viper	-	IV

Table: 3.19 List of mammals recorded/compiled in the Nahargarh WLS

Mammals					
S. No.	Scientific Name	Common Name	Family	IUCN Status	IWPA, 1972
1.	Macaca mulatta	Rhesus macaque	Cercopithecidae	LC	V
2.	Semnopithecus entellus	Grey Langur	Cercopithecidae	LC	II
3.	Panthera pardus	Panther, Leopard	Felidae	VU	I
4.	Felis chaus	Jungle cat	Felidae	LC	II
5.	Viverricula indica	Small Indian civet	Viverridae	LC	II
6.	Paradoxurus hermaphroditus	Asian palm civet	Viverridae	LC	II
7.	Herpestes edwardsi	Common mongoose	Herpestidae	LC	IV
8.	Herpestes auropunctatus	Indian mongoos	Herpestidae	LC	IV



9.	<i>Herpestes smithii</i>	Ruddy mongoose	Herpestidae	LC	IV
10	<i>Hyaena hyaena</i>	Striped hyena	Hyaenidae	NT	I
11	<i>Canis lupus</i>	Wolf	Canidae	LC	I
12	<i>Canis. aureus</i>	Jackal	Canidae	LC	II
13	<i>Vulpes bengalensis</i>	Indian Fox	Canidae	LC	II

Table: 3.20 List of amphibians recorded/compiled in the Nahargarh WLS

Amphibians					
S. No.	Scientific Name	Common Name	Family	IUCN Status	IWPA, 1972
1.	<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	Dicroglossidae	-	IV
2.	<i>Acris crepitans</i>	Cricket Frog	Hylidae	LC	IV
3.	<i>Euphlyctis cyanophlyctis</i>	Skipping Frog	Dicroglossidae	LC	IV
4.	<i>Sphaerotheca breviceps</i>	Burrowing frog	Dicroglossidae	LC	IV
5.	<i>Duttaphrynus melanostictus</i>	Common Indian Toad	Bufonidae	-	IV
6.	<i>Bufo stomaticus</i>	Marbled Toad	Bufonidae	-	IV
7.	<i>Microhyla ornata</i>	ornate narrow mouthed frog	Microhylidae	LC	IV
8.	<i>Uperodon globulosus</i>	Indian Balloon Frog	Microhylidae	-	IV

Table: 3.21 List of fishes recorded/compiled in the Nahargarh WLS

Fish				
S. No	Family	Scientific Name	Habitat	Status
1.	Viviparidac	<i>Bellamya bengalensis</i>	Akeda dams, Kukas dam	VC
2.	Lymnaeac	<i>Lymnaea acuminata</i>	Akeda dams, Kukas dam	C
3.	Plarnobidac	<i>Indoplanorbis exustus</i>	Akeda dams, Kukas dam	C
4.	Plarnobidac	<i>Gyraulux convexiusculus</i>	Akeda dams, Kukas dam	C

Table: 3.22 List of insects recorded/compiled in the Nahargarh WLS and ESZ

Insect	
Name	Habitat Remark
Mayfly	Water bodies
Dragonfly	Water Bodies
Crickets	Store
Cockroach (<i>Periplaneta americana</i>)	Store/Kitchen
Praying Mantis	Woodland, grassland
White-ante	Woodland, grass land, sub-terrcrian habitat
Bugs	Plant thicket
Mustard aphids (<i>Lipaphis erysimi</i>)	Surrounding Mustard field
Beetles:	
<i>Tribolium castaneum</i>	
<i>Neocerambyx paris</i>	Store (Locally called Sursali)
Dung - roller beetle	-
Ants	Gurbida
House Fly (<i>Musca domestica</i>)	Makkakhi



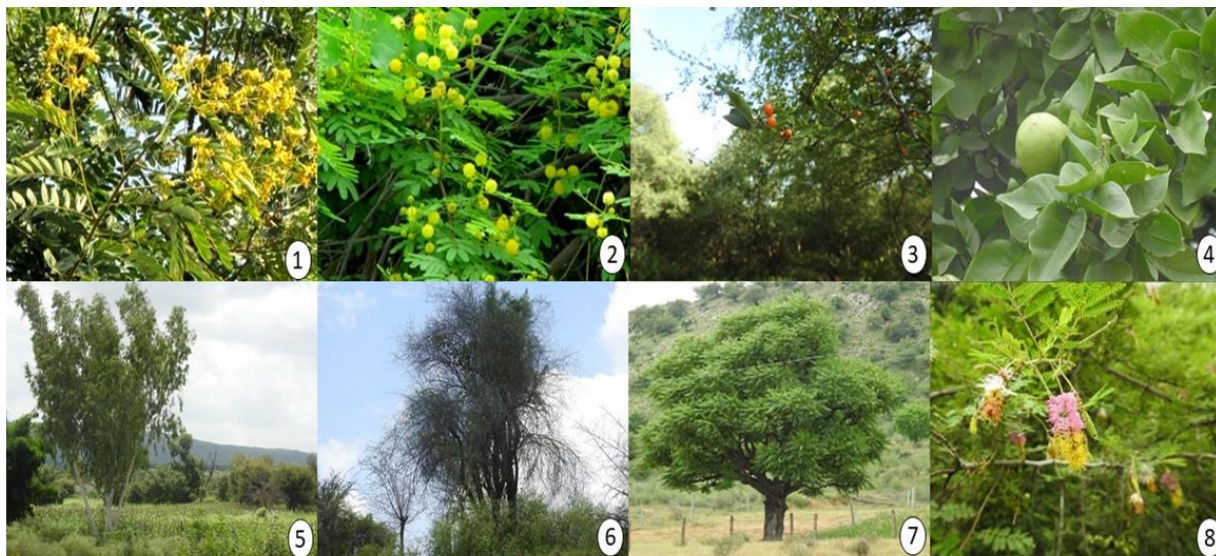
Mosquito	-
Silver fish (Lepismasp.)	Office record
Red-Cottonbug (Dysdercus cingulatus)	-
Common mernbr acid (Telinganasp.)	Tender leaves of Babool
Cicada	Singing can be heard from April to June
Bag-Worm (Cryptothelacramin)	Insect live inside acasemade of babool thorns
Bees	-
Painted Grass hopper (Poecilocerus Pictux)	Live on Calotropis plant
Common Six White Spotted Tiger-beetle (Anthiasex guttata)	Visible in rains
Jewel Beetle (Sternocrasp.)	-do-
Common death's head moth	-
Acherontia styx	
Butterfly	
Peablue (Lampides boeticus)	-
Lime butterfly	Lays eggs on members of Rutaceae
Striped Tiger (Danaus genutia)	Lays eggs on Calotropis
Common Grass yellow (Eurema hecabe)	-
Mite	Tej, Sawan-Ki-Dokri

3.3.3.4 Photographs of observed major flora and fauna in and around ESZ of Nahargarh Wildlife Sanctuary



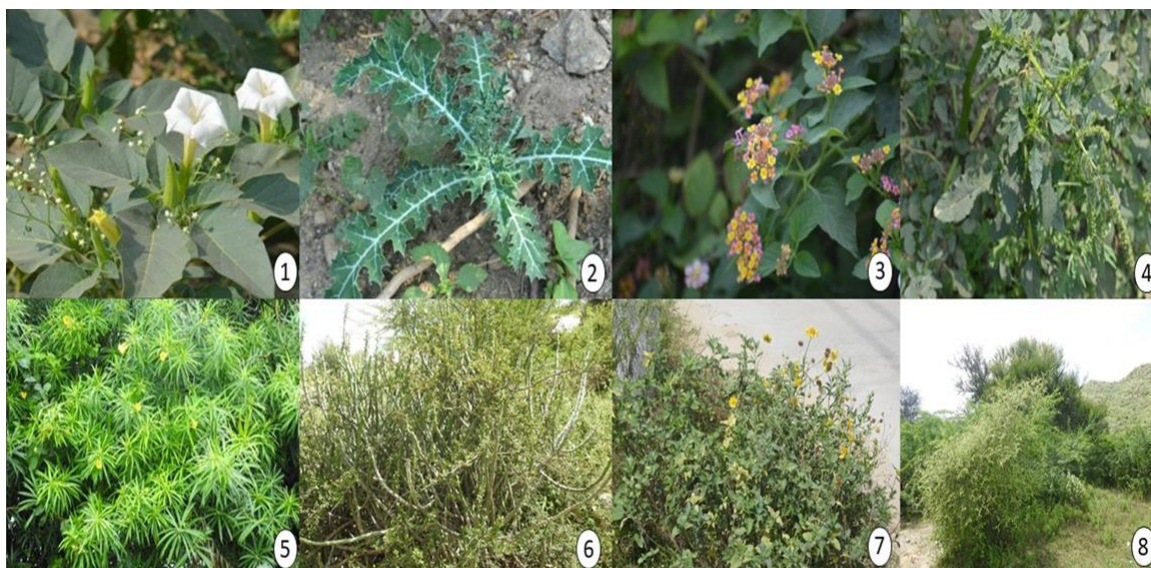
1. Albizia lebbeck 2. Alstonia scholaris 3. Ficus religiosa 4. Ficus benghalensis 5. Butea monosperma 6. Cassia fistula 7. Pongamia pinnata 8. Polyalthia longifolia

Figure No.: 3.3 Major Plants found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. *Senna siamea* 2. *Acacia nilotica* 3. *Grewia tenax* 4. *Aegle marmelos* 5. *Eucalyptus* sp. 6. *Capparis decidua* 7. *Ailanthus excelsa* 8. *Dichrostachys cinerea*

Figure No.: 3.4 Major Plants found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. *Datura metel* 2. *Lantana camara* 3. *Nerium Oleander* 4. *Euphorbia caducifolia* 5. *Verbena encelioides* 6. *Ziziphus nummularia* 7. *Ziziphus nummularia* 8. *Ziziphus nummularia*

Figure No.: 3.5 Major Plants found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. Gery heron 2. Little cormorant 3. Black winged stilt 4. Little egret 5. Desert wheatear 6. Booted eagle 7. Montagu's harrier 8. Wood sandpiper

Figure No.: 3.6 Major birds found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. Black-crowned night heron 2. Cattle egret 3. Indian pond heron 4. Spot billed duck 5. Indian cormorant 6. Red wattled lapwing 7. House crow

Figure No.: 3.7 Major birds found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. Hole of Indian desert jird 2. Hole of Spiny tailed lizard 3. Rhesus macaque 4. Indian Golden Jackal 5. Hanuman langur 6. Five stripped palm squirrel 7. Oriental garden 8. Herd of Bluebull

Figure No.: 3.8 Major animal found in and around of Nahargarh ESZ & Wildlife Sanctuary



1. Indian grey mongoose 2. Fruit bat 3. Naja naja 4. Belenois aurota 5. Blue pansy 6. Varied Eggfly 7. Yellow pansy 8. Common grass yellow

Figure No.: 3.9 Major reptile found in and around of Nahargarh ESZ & Wildlife Sanctuary

The area is subjected to many incidents of forest fires due to anthropogenic activities. The main causes of forest fires are:

- Accidental throwing of matchsticks, beedi
- Leaving the burning fuel used for cooking
- Collection of honey using fire
- Leaving fire unattended
- Burning of agricultural waste

This is leading to harmful impacts as listed below:

- Burning of ground flora and bamboo
- High temperature on soil causes soil desiccation
- Enhanced soil erosion
- Habitat of wildlife is destroyed
- Forced temporary migration of animals from the burnt area

The impact of the development activities on this Schedule-1 species can not be evident in short term, but it can take long time. Therefore, the status of these species needs to be assessed on regular bases in order to evaluate cumulative impacts leading to any changes in their population and status in the ESZ. Forest department shall regularly assess the status of these Schedules-1 species in the ESZ.

3.3.4 Wild Life

The Nahargarh Eco-Sensitive Zone is a treasure trove of natural wonders, boasting a diverse tapestry of ecosystems seamlessly intertwined within its boundaries. This harmonious blend of wetlands, riparian zones, and the majestic Aravalli hills creates the perfect backdrop for an immersive experience in nature-based tourism.

The ecological richness of the Nahargarh Eco-Sensitive Zone extends to its vibrant flora. Within this zone, there is a stunning array of botanical wonders, including 85 species of trees, 19 species of shrubs, 29 species of climbers, and 20 species of grasses, all thriving in the tropical dry deciduous and tropical thorn forests. Notably, the *Anogeissus* tree stands as a cornerstone species in this forest ecosystem, heralding the changing seasons with its leaves transitioning from lush green during the rainy season to ash-colored in winter. This distinctive feature adds to the zone's allure and is a visual delight for visitors.

The lush vegetation within this zone provides essential sustenance for its rich wildlife. A total of 33 mammal species calls this sanctuary home, with the Panther reigning as the most splendid among them. Other captivating species include the Blue Bull, Hyena, Porcupine, Jackal, Fox, Jungle Cat, Desert Cat, Civet, and Mongoose. The Nahargarh Eco-Sensitive Zone is also a thriving habitat for reptiles and amphibians, frequently sighted around the Ramsagar area.

Furthermore, this ecological haven is graced by 22 species of insects, 7 species of butterflies, and 10 species of fish, adding an extra layer of biodiversity and natural wonder to explore. This combination of diverse ecosystems and abundant wildlife makes the Nahargarh Eco-Sensitive Zone a prime destination for those seeking to immerse themselves in the beauty and splendor of nature.

3.3.5 Rare Species of Nahargarh Biological Park and Forests of Nahargarh Wildlife Sanctuary

It includes flora and faunal species i.e. vegetation, reptiles, birds, important plant species and medicinal plants etc. which are important and rare found in the Nahargarh Biological Park, and Wildlife Sanctuary; mentioned as under:

1. Rare Species of the Nahargarh Biological Park
 - a) Vegetation- *Anogeissus sericia* and *Butea monosperma*



- b) Reptiles- Fat Tailed Gecko, Saw Scaled Viper
 - c) Birds- White Naped Tit, White Bellied Minivet,
2. Important plant species in the forest are mentioned below:

- a) *Anogeissus pendula*
- b) *Acacia senegal*
- c) *Balanites aegyptiaca*
- d) *Lannea coromandelica*
- e) *Acacia nilotica*
- f) *Tecomella undulata*
- g) *Prosopis cineraria*
- h) *Acacia leucophloea*
- i) *Maytenus emarginata*
- j) *Bauhinia racemosa*
- k) *Adina cordifolia*
- l) *Jatropha curcas*

3. Medicinal Plant Species

Apart from the above-mentioned species of the forest plants, below mentioned medicinal plants are also found in the Nahargarh Wildlife Sanctuary:

- a) *Cissus quadrangularis*
- b) *Boswellia serrata*
- c) *Plumbago zeylanica*
- d) *Terminalia bellirica*
- e) *Euphorbia nerifolia*
- f) *Solanum surattense*
- g) *Boerhavia diffusa*
- h) *Jatropha gossypifolia*
- i) *Sterculia urens*
- j) *Commiphora wightii*
- k) *Eclipta alba*
- l) *Barleria prionitis*
- m) *Withania somnifera*
- n) *Bacopa monnieri*



- o) *Evolvulus alsinoides*
- p) *Andrographis paniculata*



4. DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE

4.1 Overview

Demography is the study of human populations, including their size, structure, distribution, and characteristics. It is a social science that examines various aspects of populations, such as birth rates, death rates, migration patterns, age distribution, gender composition, fertility rates, and other demographic variables.

Demographic studies also provide insights into societal changes, such as shifts in family structures, urbanization, aging populations, and the impact of migration on communities. Additionally, demography plays a vital role in understanding patterns of inequality, social disparities, and the distribution of resources within and between populations.

Demographic information is gathered through various methods, including census surveys, vital registration systems, sample surveys, and administrative data. These data sources provide valuable information for analyzing population trends, developing policies, and addressing social and economic challenges associated with population changes.

4.2 Demography

As per Census 2011, district Jaipur covers a population of 66, 26,178, which lives in 11, 77,096 households (HHs). Out of the total population, 31, 54,331 (47.60%) resides in rural areas while 34, 71,847 (52.40%) live in urban areas. The average HHs size of the districts is six (6) persons per household for the district; same for Jaipur rural settlements, while five (5) persons for Jaipur Urban area.

Table: 4.1 Population Characteristics of Jaipur Urban/Rural Settlements, 2011

S. No.	District Jaipur	Settlement	Population	No. of House holds
1.	Jaipur	Total	6626178	1177096
2.	Jaipur	Rural	3154331	507803
3.	Jaipur	Urban	3471847	669293

Source: Census of India 2011

4.2.1 Population Distribution of Nahargarh ESZ & Wildlife Sanctuary

In accordance to the Gazette announcement of March 8, 2019, the following 25 villages are included in the Nahargarh ESZ. 12 villages (partially or entirely) fall inside the Nahargarh Wildlife Sanctuary, while the remaining 13 villages are under the Nahargarh ESZ Region. As seen in Fig. 4.1, the boundaries of the revenue villages have been placed



on a map of the Nahargarh Eco-Sensitive Zone. The Nahargarh Wildlife Sanctuary's boundaries are also depicted on this map.

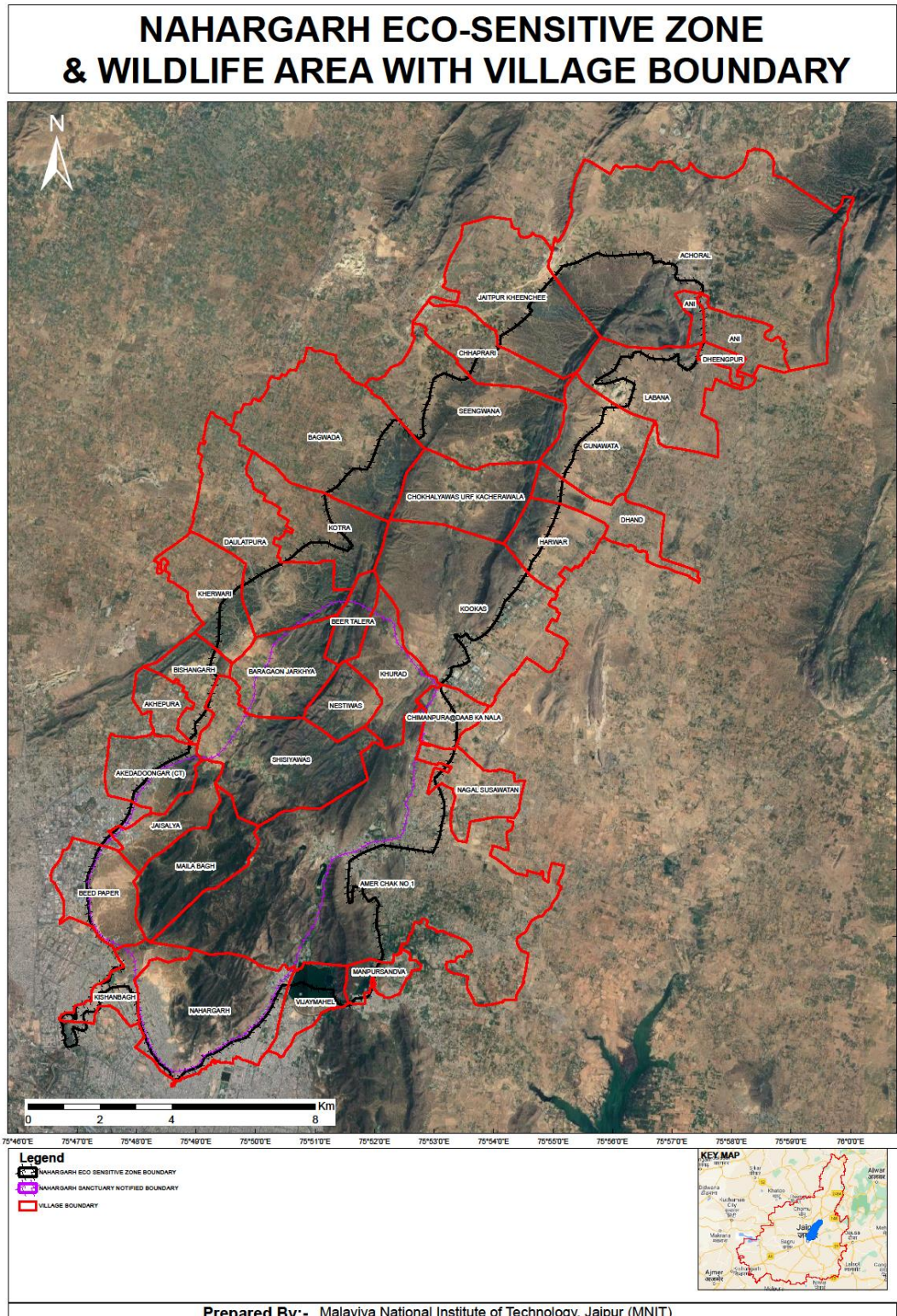


Figure No.: 4.1 Village Settlements in Nahargarh ESZ Area, 2022

According to the Census 2011, there are 1,93,433 people living in 97,165 HHs in the Nahargarh ESZ region, including the Nahargarh Wildlife Sanctuary.

4.3 Socio- Economic Characteristics

This section deals with the Census 2011 data to understand the workers population and their share of working practices in the Nahargarh ESZ area. Moreover, a wide range of data collected from the field using questionnaire method for the collection of information upon socio-economic characteristics are also discussed in this section. A result of the sample of household survey conducted is shown in Annexure- 2.

4.3.1 Workers Profile

To understand the economic profile of the study area, it is important to study the workers characteristics of the Nahargarh ESZ. These characteristics can be ideally represented by Work Force Participation Ratio (WFPR) based on the Census 2011.

Table: 4.2 Work Force Participation Rate, Jaipur District, 2011

S. No.	Settlement	Population	Total Workers	WFPR
1.	District Jaipur	6,626,178	2,464,893	37.20
2.	Rural	3,154,331	1,346,659	42.69
3.	Urban	3,471,847	1,118,234	32.21

Source: Census 2011.

As per Census 2011, Jaipur district has a total WFPR of 37.20 percent. The rural WFPR is 42.69 and for the urban areas it is 32.21 percent. As per MDP Jaipur (2025), the WFPR for the year 2001 was 35.5 percent for the district, for the rural areas the ratio was 40.40 percent and urban, it was 30.40 percent. Thus, the ratio in year 2011 and 2001 was higher in case of the rural areas, and it is gradually improving with the passage of the time.

The WFPR of Nahargarh ESZ, it is 31.64 percent it is highest for the Sisyawas village (49.21 percent) while lowest in urban area of Jaipur (Ganga Vihar Colony) as 29.93 percent.



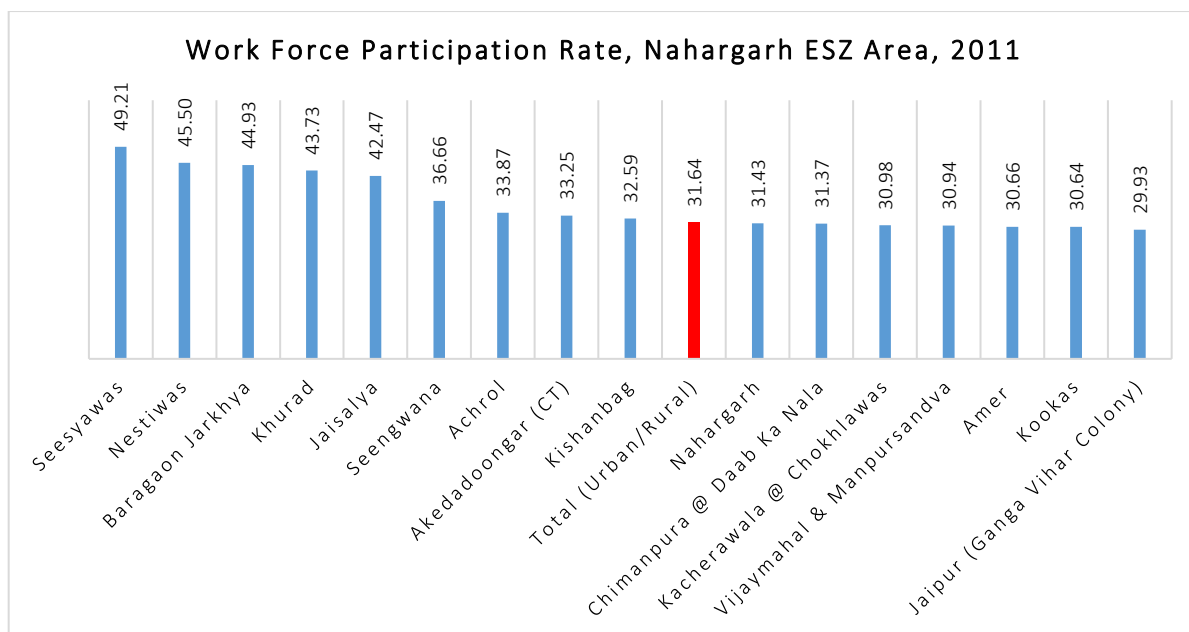


Figure No.: 4.2 Work Force Participation Rate, Nahargarh ESZ Area, 2011

Source: Census 2011.

Above figure depicts that rural settlements have more WFPR while in urban settlement it is less which means that percentage wise population of rural workers is more (may be agricultural practices) as compared to urban areas.

5. POLLUTION STATUS & ENVIRONMENT STUDIES

5.1 Introduction

“Pollution is the introductions of substances (or energy) that cause adverse changes in the environment and living entities.”

Pollution is the addition of any substance (solid, liquid, or gas) or any form of energy (such as heat, sound, or radioactivity) to the environment at a rate faster than it can be dispersed, diluted, decomposed, recycled, or stored in some harmless form. The major kinds of pollution, usually classified by the environment, are air pollution, water pollution, and land pollution. Modern society is also concerned about specific types of pollutants, such as noise pollution, light pollution, and plastic pollution. Pollution of all kinds can have negative effects on the environment and wildlife and often impacts human health and well-being.

Nahargarh Eco-Sensitive Zone notification Sub-para 5 of Section 2 has a mention that needs of local community & others aspects of ecology and environment that need attention may be delt in the Zonal Master Plan. Further to this Section 6 to 16 deals with various types pollution or pollution causing activities. These are noise pollution, air pollution, discharge of effluents, solid waste, bio-medical waste, plastic waste management, construction and demolition waste management, e-waste, vehicular pollution, vehicular traffic & industrial units.

It is important to take all the necessary actions immediately to avoid the impact of it on our heritage, wildlife and eco-system with in ESZ. Type of pollution affecting the ecosystem are discussed below:

1. Air Pollution
2. Discharge of Effluents (Water Pollution)
3. Soil Pollution
4. Noise Pollution

5.1.1 Air Pollution

Air pollution refers to the release of harmful contaminants (chemicals, toxic gases, particulates, biological molecules, etc.) into the earth’s atmosphere. These contaminants



are quite detrimental and, in some cases, pose serious health issues. Some causes that contribute to air pollution are:

- I. Burning fossil fuels
- II. Mining operations including stone crushers
- III. Exhaust gases from industries and factories
- IV. Vehicular Pollution- It also plays an important role in causing air pollution because the emission
- V. Seasonal Sandstorm also causes air pollution

The effects of air pollution vary based on the kind of pollutant. But generally, the impact of air pollution ranges from:

- I. Increased risk of respiratory illness and cardiovascular problems
- II. Increased risk of skin diseases
- III. May increase the risk of cancer
- IV. Global warming
- V. Acid rain
- VI. Ozone depletion
- VII. Hazards to wildlife

Among the other types of pollution, air pollution is theorized to have a planet-wide implication. Scientists have even speculated an apocalypse-like scenario where air pollution, if left unchecked, can bring about an extreme form of global warming called the Runaway Greenhouse Effect. As per the present study there is no significant air pollution in this area. Vishwakarma Industrial Area is adjacent to Nahargarh Eco-Sensitive Zone boundary and hence there may be effects of air pollution in future if there is expansion in industrial activities & using fossil fuels. Similarly, there are two industrial areas near ESZ which are Akeda Dunger & Kukas Industrial Area.

5.1.2 Water Pollution (Discharge of Effluents)

Water pollution is said to occur when toxic pollutants and particulate matter are introduced into water bodies such as lakes, rivers and seas. These contaminants are generally introduced by human activities like improper sewage treatment or lack of sewerage systems and oil spills. However, even natural processes such as eutrophication can cause water pollution.



Other significant causes of water pollution include:

- Dumping solid wastes in water bodies
- Disposing of untreated industrial sewage into water bodies
- Human and animal wastes due to the absence of a proper sewerage system
- Agricultural runoff containing pesticides and fertilizers

The effects of water pollution are very pronounced in our environment. Furthermore, toxic chemicals can bio-accumulate in living beings, and these chemicals can travel their way up the food chain, ultimately reaching humans.

Among the other types of pollution, water pollution has severe consequences on humans. For instance, in 1932, a grave case of water pollution incapacitated the inhabitants of an entire city in Japan with neurological diseases and mental illness for many decades. However, the immediate cause was not apparent but was eventually attributed to acute mercury poisoning. Methylmercury was dumped into the surrounding bay and ultimately bio-accumulated inside the fish. The local population then consumed these fish, and this resulted in the manifestation of ill effects and neurological diseases.

Other consequences of water pollution include:

- Disruption of the ecosystem
- Threats to aquatic life
- Increased risk of water-borne diseases
- Increases in toxic chemicals (such as mercury) in water bodies
- Eutrophication

At present there is no effluent coming in this area from Jaipur city, Amer & Kukas as the slope is away from this area which can be seen from drainage pattern. There are five villages falling in Wildlife Sanctuary Area and Eco-Sensitive Zone Area and these are Singwana, Chokhalywas, Nestiwas, Khurad & Shishyawas. There is no sewerage disposal/treatment facility in these villages and the disposal is in open drains. At present the population of these villages is insignificant. The villages like Shishyawas, Nestiwas & Khurad lies in Wildlife Sanctuary Area whereas Singwana and Choklayawas lies in Eco-Sensitive Zone Area. The population of Shishyawas residing within WLS boundary is quite less. As per census 2011 the population of village Nestiwas, Khurad, Singwana, Choklayawas & Baragaon Jarkhaya is 189, 542, 982, 894 & 819 persons respectively. However appropriate solution for disposal and treatment of sewerage is needed.



5.1.3 Soil Pollution

Soil pollution, also called soil contamination, refers to the degradation of land due to the presence of chemicals or other man-made substances in the soil. The xenobiotic substances alter the natural composition of soil and affect it negatively. These can drastically impact life directly or indirectly. For instance, any toxic chemicals present in the soil will get absorbed by the plants. Since plants are producers in an environment, it gets passed up through the food chain. Compared to the other types of pollution, the effects of soil pollution are a little more obscured, but their implications are very noticeable.

Some of the common causes of soil pollution are:

- Improper industrial waste disposal
- Oil spills
- Acid rain which is caused by air pollution
- Mining activities
- Intensive farming and agrochemicals (like fertilizers and pesticides)
- Industrial accidents

Other effects of soil pollution include:

- Less of soil nutrients, which renders the soil unfit for agriculture
- Impacts the natural flora and fauna residing in the soil
- Degrades vegetation due to the increase of salinity of the soil

At present there is significant soil pollution.

5.1.4 Noise Pollution

Noise pollution refers to the excessive amount of noise in the surrounding that disrupts the natural balance. Usually, it is man-made, though certain natural calamities like volcanoes can contribute to noise pollution.

In general, any sound which is over 85 decibels is considered to be detrimental. Also, the duration an individual is exposed plays an impact on their health. For perspective, a normal conversation is around 60 decibels, and a jet taking off is around 150 decibels. Consequently, noise pollution is more obvious than other types of pollution. In case of wild animals, the detrimental threshold of noise level is less when compared to humans. Most wild animals shy away from high decibel noises.



Noise pollution has several contributors, which include:

- Industry-oriented noises such as heavy machines, mills, factories, etc.
- Transportation noises from vehicles, aero planes, etc.
- Construction noises
- Noise from social events (loudspeakers, firecrackers, etc.)
- Household noises (such as mixers, TV, washing machines, etc.)

Noise pollution has now become very common due to dense urbanization and industrialization. Noise pollution can bring about adverse effects such as:

- Hearing loss
- Tinnitus
- Sleeping disorders
- Hypertension (high BP)
- Communication problems
- In the case of wildlife habitats, the effects may be much more disturbing.

At present there is no significant noise pollution in this area however the pollution caused due to commercial activities like Resorts needs to be checked.

5.2 Baseline Studies for Existing Environmental Conditions

It is extremely important to conduct environment studies in order to understand existing environmental site situations and compare it with the standard norms. It is not necessary as per the Nahargarh ESZ notification to conduct the baseline studies but these studies have been conducted in order to compare environment conditions in future and also to know whether the undertaken mitigation measures were sufficient or not to improve the environment.

5.2.1 Introduction to Baseline Studies

Baseline study is an essential component for impact assessment of any future development around the sensitive area. This data provides the basis on which an impact assessment can be carried out. It not only helps to determine the existing scenario of the study area in terms of environment conditions but also helps in identification of external environment drivers which may have an impact on the identified environmental components due to future developments within or nearby the area. This will further assist in identifying & redefining hotspots.



The baseline around the Nahargarh Sanctuary was carried out to assess the baseline environmental condition for ambient air, noise, soil, ground and surface water through field monitoring during the period of 31/10/2022 to 10/11/2022.

5.2.2 Locations of Monitoring

Three monitoring stations were selected for monitoring of ambient air and noise. Four monitoring stations were selected for soil. Four monitoring stations were selected for sampling of ground water and three monitoring stations were selected for sampling of surface water.

Table: 5.1 List of Monitoring Locations

S. No.	Sampling Location	Latitude	Longitude	Remarks
Ambient Air				
1	Vishwakarma Industrial Area	26°59'37.8"N	75°47'16.1"E	Major industrial area nearby & 2 nd predominant upwind direction of sensitive area as per Annual, Summer & post monsoon season Windrose
2	Brahmapuri	26°56'14.8"N	75°48'18.3"E	1 st predominant Upwind location to the sensitive area as per Annual, Summer & post monsoon season Windorse
3		26°56'12.2"N	75°49'34.4"E	
4	Kukas	27°02'01.5"N	75°53'51.2"E	1 st predominant downwind location to the sensitive area as per Annual, Summer & post monsoon season Windorse
		27°01'48.8"N	75°53'44.7"E	
Ambient Noise				
1	Vishwakarma Industrial Area	26°59'37.8"N	75°47'16.1"E	Major industrial area nearby, major source of industrial, commercial, vehicular noise in the area
2	Brahmapuri	26°56'14.7"N	75°49'30.8"E	1st predominant Upwind location to the sensitive area as per Annual, Summer & post monsoon season Windorse, major source of city composite noise
3	Kukas	27°01'48.0"N	75°53'42.9"E	1st predominant downwind location to the sensitive area as per Annual, Summer & post monsoon season Windorse, major source of rural noise
Ground water				
1	Vishwakarma Industrial Area	26°59'12.7"N	75°46'52.2"E	Major industrial area nearby
2	Brahmapuri	26°56'14.8"N	75°49'31.1"E	Ground water source near urban area
3	Kukas	27°25'59.1"N	75°53'35.0"E	Ground water source near rural area and near the stream passing through sensitive area
4	Achrol	27°08'16.4"N	75°54'41.7"E	Ground water source near rural area near the stream passing through sensitive area
Surface water				
1	Swarna Javanti Park	26°57'29.9"N	75°47'38.6"E	



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2	Maotha Lake, Amer	26°58'50.7"N	75°51'04.3"E	Major water body
3	Man Sagar Lake	26°57'37.8"N	75°50'43.6"E	
Soil				
1	Vishwakarma Industrial Are	26°59'13.7"N	75°46'50.8"E	Major industrial area nearby
2	Brahmapuri	26°56'07.3"N	75°49'29.9"E	Urban area
3	Kukas	27°02'16.2"N	75°53'27.9"E	Rural area
4	Achrol	27°05'05.6"N	75°56'49.3"E	Rural area



MAP SHOWING AIR, WATER, NOISE & SOIL MONITORING LOCATIONS

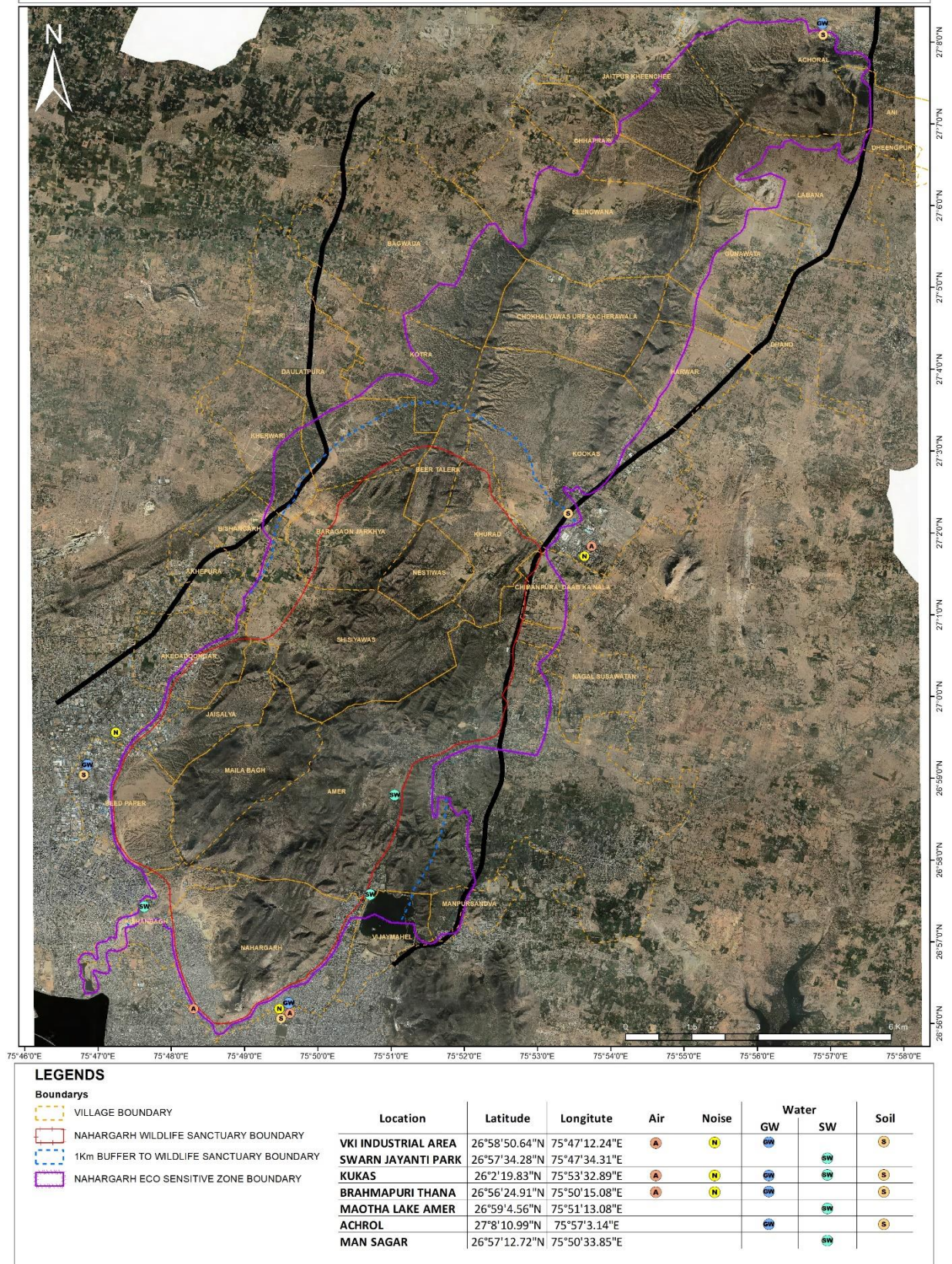


Figure No.: 5.1 Map showing Air, Water, Noise and Soil Monitoring locations.

5.2.3 Monitoring Methodology

Reconnaissance survey was conducted and sampling locations were identified on the basis of:

- Predominant wind directions in the area during year, and season
- Existing topography, location of surface water bodies like ponds, canals and rivers;
- Location of villages/towns/industrial areas with respect to sensitive area
- Areas which represent baseline conditions.

5.2.4 Components of Baseline Studies

Various components of environments which studied during the baseline data generation are as under:

- Soil Environment
- Air Environment
- Water Environment
- Noise Environment

5.2.5 Soil Environment

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is unconsolidated mineral matter that has been subjected to and influenced by genetic and environmental factors, such as parent material climate organism and physiochemical action of wind, water and sunlight all acting over a long period of time. Soil differs from the parent materials in the morphological, physical, chemical and biological properties.

5.2.5.1 Methodology

For studying soil quality of the region, a sample was collected to assess the existing soil conditions in and around the project area. The sample was collected by ramming a core-cutter into the soil up to a depth of 90 cm. The present study on the soil quality establishes the baseline characteristics and identifies the incremental concentrations, if any, due to the proposed project. The objective of the sampling is to determine the baseline soil characteristics of the area.

5.2.5.2 To determine the baseline soil characteristics of the area

The soil sample was collected from three different depths viz. 30 cm, 60 cm and 90 cm. The samples were then packed in a polythene plastic bag and sealed. The samples from three different depths were homogenized and then were analyzed. This is in line with IS: 2720 and IS: 9497 and Handbook of Method in Environmental Studies by S.K. Maiti. The homogenized samples were analyzed for physical and chemical characteristics. The soil samples were collected and analysis representing winter season. The samples have been analyzed as per the established scientific methods for physio-chemical parameters.

5.2.5.3 Soil Analysis Results

Soil analysis results of study area are mentioned in table 5.2 as under.

Table: 5.2 Soil Analysis Results

S. No.	Parameters	Test Protocol	Unit	S1	S2	S3	S4
				VKIA	Brahmapuri	Kukas	Achrol
1	pH	IS 2720 (P-26):1987	-	8.11	7.45	7.75	7.57
2	Appearance	USDA	-	Light Brown	Light Brown	Light Brown	Light Brown
3	Conductivity	IS 14467:2002	μS/ cm	366	455	476	375
4	Bulk Density	USDA	gm/cc	1.29	1.32	1.29	1.14
5	Moisture	IS 2720 (P-2):2011	% by mass	5.86	11.54	9.85	7.52
6	Permeability	USDA	cm/hr	24	18	21	14
7	Porosity	USDA	% by mass	42.11	45.8	40.6	44.4
8	Organic Matter	IS 2720 (P-22):1972	% by mass	0.48	0.55	0.42	0.38
9	Total Phosphorous	USDA	mg/kg	32.2	35.6	38.8	22.45
10	Available Nitrogen	IS 14684 1999	mg/kg	338	362	415.84	372
11	Total Sodium	USDA	mg/kg	69.54	55.28	76	51.8
12	Total Potassium	USDA	mg/kg	132.65	156.4	168.42	202.54

13	Copper	APHA-3030D APHA-3111B	mg/kg	ND	ND	ND	ND
14	Cadmium	APHA-3030D APHA-3111B	mg/kg	ND	ND	ND	ND
15	Iron	APHA-3030D APHA-3111B	mg/kg	15.42	2.65	3.54	5.63
16	Zinc	APHA-3030D APHA-3111B	mg/kg	ND	ND	ND	ND
17	Boron	USDA	mg/kg	ND	ND	ND	ND
18	Texture	USDA	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
	Sand	USDA	%	65.1	62.7	66.4	64.8
	Silt		%	18.1	19	19.5	18.6
	Clay		%	16.8	18.2	14	16.6

Table: 5.3 Standard Soil Classification

S. No.	Soil Test	Classification
1	pH	< 4.5 Extremely acidic
		4.51 – 5.00 Very strongly acidic
		5.51 – 6.0 moderately acidic
		6.01 – 6.50 slightly acidic
		6.51 – 7.30 Neutral
		7.31 – 7.80 Slightly alkaline
		7.81 – 8.50 Moderately alkaline
		8.51 – 9.0 Strongly alkaline
		9.01 very strongly alkaline
2	Salinity Electrical Conductivity (mmhos/cm) (1mmho/ cm=640 ppm)	Upto 1.00 Average
		1.01 – 2.00 harmful to germination
		2.01 – 3.00 harmful to crops
3	Organic Carbon (%)	Up to 0.2 – very less
		0.21 – 0.4 – less
		0.41 – 0.5 – medium
		0.51 – 0.8 – on an average sufficient
		0.81 – 1.00 – sufficient
		>1.0 more than sufficient

4	Nitrogen (Kg/ ha)	Up to 50 very less
		51 – 100 less
		101 – 150 good
		151 – 300 better
		>300 sufficient
5	Phosphorus (Kg/ha)	Up to 15 very less
		16 – 30 less
		31 – 50 medium
		51 – 65 on an average sufficient
		66 – 80 sufficient
6	Potassium (Kg/ ha)	>80 more than sufficient
		0 – 120 very less
		120 – 180 less
		181 – 240 medium
		241 – 300 average
		301 – 360 better
		>360 more than sufficient

Source: ICAR (Indian Council for Agricultural Research)

5.2.5.4 Observations

- pH of the soil samples ranged from 7.45 to 8.11.
- The texture of soil observed in the study area is mostly Sandy Loam.
- The electrical conductivity of the samples varied from 366 to 476 $\mu\text{S}/\text{cm}$.
- The organic matter in the soil ranged from 0.38 to 0.55%.
- Potassium in the soil ranged from 132.65 to 202.54 mg/kg.
- Phosphorus in the soil ranged from 22.45 to 38.8 mg/kg.

5.2.5.5 Interpretation

The result obtained is compared with the standard soil classification given in Agriculture Soil Limits based on soil analysis data it is concluded that soils is slightly alkaline in nature. The organic carbon content is medium range in soil.

5.2.6 Water Environment

Ground water resources and surface water in the study area have been studied by assessing the water environment. The purpose of this study is to:

- Assess the water quality characteristics for critical parameters;

5.2.6.1 Methodology

Monitoring locations were finalized based on:



- Drainage pattern;
- Tube wells (utilized for drinking water purposes)
- Location of industrial and residential areas representing different activities/ likely impact areas; and
- Likely areas, which can represent baseline conditions
- Surface water (if any) in study area;

5.2.6.2 Water Sample Analysis

The samples drawn were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the present ground water quality of the area. The samples were analysed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). Samples for chemical analysis were collected in polyethylene carboys. Samples collected for metal content were acidified with 1 ml HNO₃. Parameters like temperature, Dissolved Oxygen (DO) and pH were measured at site itself.

Table: 5.4 Analytical Protocol followed for Water Quality Monitoring and Analysis

S. No.	Parameter	Test Protocol
1	pH	IS 3025(P-11):1983, RA 2017
2	EC	IS 3025(P-11):1983, RA 2017
3	Total Dissolved Solids	IS 3025(P-16):1984, RA 2017
4	Total Suspended Solids	IS 3025 (P-17):1984, RA 2017
5	Total Hardness	IS 3025(P-21):2009, RA 2019
6	Calcium	IS 3025(P-40):1991, RA 2019
7	Magnesium as Mg	IS 3025(P-46):1994, RA 2019
8	Alkalinity	IS 3025(P-23):1986, RA 2019
9	Chloride as Cl	IS 3025(P-32):1988, RA 2019
10	Residual Chlorine	APHA (22nd Edition) 4500 Cl B
11	Fluoride as F	IS 3025(P-60):2008, RA 2019
12	Sulphate as SO ₄	IS 3025(P-24):1986, RA 2019
13	Nitrate as NO ₃	IS 3025(P-34):1988, RA 2019
14	Zinc as Zn	APHA (22nd Edition) 3111 B
15	Lead as Pb	APHA (22nd Edition) 3111 B
16	Manganese as Mn	APHA (22nd Edition) 3111 B
17	Iron as Fe	IS 3025(P-53):2003, RA 2019
18	Cadmium as Cd	APHA (22nd Edition) 3111 B
19	Nickel as Ni	APHA (22nd Edition) 3111 B
20	Copper as Cu	APHA (22nd Edition) 3111 B



21	Total Chromium as Cr	APHA (22nd Edition) 3111 B
22	Phenolic Compound as C ₆ H ₅ OH	APHA (22nd Edition) 5530 C
23	Mercury as Hg	APHA (22nd Edition) 3112 B
24	Selenium as Se	APHA (22nd Edition) 3114 B
25	Arsenic as As	APHA (22nd Edition) 3114 B
26	Cyanide as CN	APHA (22nd Edition) 4500 B
27	Anionic detergents as MBAS	Annex K of IS:13428
28	Mineral Oil	APHA (22nd Edition) 5520 B
29	Aluminums as Al	APHA (22nd Edition) 3111 D
30	Boron as B	APHA (22nd Edition) 4500B-B
31	Total Coliform	APHA (22nd Edition) 9221 D
32	<i>Escherichia Coli</i>	APHA (22nd Edition) 9221 D

Table: 5.5 Primary Water Quality Criteria for Designated-Best-Use-Classes

S. No.	Designated-Best-Use	Category	Criteria Description
1	Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less
2			pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more
3			Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
4	Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less
5			pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more
6			Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
7	Drinking water source after conventional treatment and Disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less
8			pH between 6 to 9
9			Dissolved Oxygen 4mg/l or more
10			Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
11	Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5
12			Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
13	Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5
14			Electrical Conductivity at 25°C micro mhos/cm Max.2250
15			Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
16		Below-E	Not Meeting A, B, C, D & E Criteria

Source: CPCB



5.2.6.3 Presentation of Results

The analytical results of water samples are given in Table 5.6 & 5.7 for ground water and surface water samples. The quality of ground water samples was compared with IS: 10500 standards.

Table: 5.6 Ground Water Analysis Report

S. No.	Parameter	Test Protocol	CODE	GW1	GW2	GW3	GW4	Acceptable Limit	Permissible Limit
			NAME	VKIA	Brahmapuri	Kukas	Achrol		
1	pH	IS 3025(P-11):1983, RA 2017	--	7.13	7.31	7.42	7.18	6.5 – 8.5	N.R.
2	EC	IS 3025(P-11):1983, RA 2017	µS/cm	2468.46	1532	3650	3911.38	--	--
3	Total Dissolved Solids	IS 3025(P-16):1984, RA 2017	mg/l	1604.5	995.8	2372.5	2542.4	500	2000
4	Total Suspended Solids	IS 3025 (P-17):1984, RA 2017	mg/l	29.65	19.17	32.68	36.94	--	--
5	Total Hardness	IS 3025(P-21):2009, RA 2019	mg/l	809.16	345.38	819.03	1124.94	200	600
6	Calcium	IS 3025(P-40):1991, RA 2019	mg/l	201.54	94.84	142.27	162.03	75	200
7	Magnesium as Mg	IS 3025(P-46):1994, RA 2019	mg/l	75.33	26.73	114.21	177.39	30	100
8	Alkalinity	IS 3025(P-23):1986, RA 2019	mg/l	124.5	269.75	881.88	570.63	200	600
9	Chloride as Cl	IS 3025(P-32):1988, RA 2019	mg/l	29.18	282.46	513.15	630.83	250	1000
10	Residual Chlorine	APHA (22nd Edition) 4500 Cl B	mg/l	475.48	<0.01	<0.01	<0.01	0.2	1
11	Fluoride as F	IS 3025(P-60):2008, RA 2019	mg/l	0.24	0.2	0.31	0.34	1	1.5



12	Sulphate as SO ₄	IS 3025(P-24):1986, RA 2019	mg/l	188.3	112.98	205.2	252.18	200	400
13	Nitrate as NO ₃	IS 3025(P-34):1988, RA 2019	mg/l	11.88	25.14	84.12	54.45	45	N.R.
14	Zinc as Zn	APHA (22nd Edition) 3111 B	mg/l	0.11	0.07	0.13	0.14	5	15
15	Lead as Pb	APHA (22nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	N.R.
16	Manganese as Mn	APHA (22nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.1	0.3
17	Iron as Fe	IS 3025(P-53):2003, RA 2019	mg/l	0.13	0.11	0.15	0.17	0.3	N.R.
18	Cadmium as Cd	APHA (22nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.003	N.R.
19	Nickel as Ni	APHA (22nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.02	N.R.
20	Copper as Cu	APHA (22nd Edition) 3111 B	mg/l	0.02	<0.01	<0.01	<0.01	0.05	1.5
21	Total Chromium as Cr	APHA (22nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.05	N.R.
22	Phenolic Compound as C ₆ H ₅ OH	APHA (22nd Edition) 5530 C	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	0.002
23	Mercury as Hg	APHA (22nd Edition) 3112 B	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	N.R.
24	Selenium as Se	APHA (22nd Edition) 3114 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	N.R.
25	Arsenic as As	APHA (22nd Edition) 3114 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	0.05



26	Cyanide as CN	APHA (22nd Edition) 4500 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.05	N.R.
27	Anionic detergents as MBAS	Annex K of IS:13428	mg/l	<0.001	<0.001	<0.001	<0.001	0.2	1
28	Mineral Oil	APHA (22nd Edition) 5520 B	mg/l	<0.01	<0.01	<0.01	<0.01	0.5	N.R.
29	Aluminum as Al	APHA (22nd Edition) 3111 D	mg/l	<0.01	<0.01	<0.01	<0.01	0.03	0.2
30	Boron as B	APHA (22nd Edition) 4500B-B	mg/l	<0.1	<0.1	<0.1	<0.1	0.5	1
31	Total Coliform	APHA (22nd Edition) 9221 D	MPN/100 ml	Absent	Absent	Absent	Absent	Absent	Absent
32	<i>Escherichia Coli</i>	APHA (22nd Edition) 9221 D	MPN/100 ml	Absent	Absent	Absent	Absent	Absent	Absent

5.2.6.4 Interpretation of Ground Water Quality Data

The analysis results indicate that pH of the groundwater was found to be in range of 7.13 to 7.42. The TDS were found to be in the range of 995.80 mg/l to 2542.40 mg/l. Other parameters like Total Hardness (345.38-1124.94 Mg/ l), Total Alkalinity (124.50 -881.88 Mg/ l), Calcium as Ca (94.84 to 201.54 mg/l), Magnesium as Mg (26.73 - 177.39 Mg/ l), Chloride as Cl (29.18-630.83 Mg/ l), Sulphate as SO₄ (112.98-252.18 Mg/l) and Fluoride as F- (0.2-0.34 Mg/l) were found within the prescribed limits except TDS is higher than permissible limit at Kukas and Achrol. The water quality is potable in nature after suitable treatment.

Table: 5.7 Surface water analysis result of the study area

S. No.	Parameter	Test Protocol	CODE	SW1	SW2	SW3
			NAME	Swarna Jayanti Park	Maatha Lake Amer	Man Sagar Lake
1	pH	IS 3025(P-11):1983, RA 2017	--	7.15	7.09	7.21
2	EC	IS 3025(P-11):1983, RA 2017	µS	1919.23	911.85	1791.07



3	Total Dissolved Solids	IS 3025(P-16):1984, RA 2017	mg/l	1247.5	592.7	1164.2
4	Total Hardness	IS 3025(P-21):2009, RA 2019	mg/l	463.79	217.09	325.64
5	Calcium	IS 3025(P-40):1991, RA 2019	mg/l	130.41	47.42	39.52
6	Magnesium as Mg	IS 3025(P-46):1994, RA 2019	mg/l	34.02	24.3	55.89
7	Alkalinity	IS 3025(P-23):1986, RA 2019	mg/l	477.25	228.25	332
8	Chloride as Cl	IS 3025(P-32):1988, RA 2019	mg/l	235.38	103.57	371.91
9	Residual Chorine	APHA (22 nd Edition) 4500 Cl B	mg/l	N.D.	N.D.	N.D.
10	Fluoride as F	IS 3025(P-60):2008, RA 2019	mg/l	0.22	0.11	0.21
11	Sulphate as SO ₄	IS 3025(P-24):1986, RA 2019	mg/l	94.02	41.2	148.4
12	Nitrate as NO ₃	IS 3025(P-34):1988, RA 2019	mg/l	45.12	21.11	31.18
13	Zinc as Zn	APHA (22 nd Edition) 3111 B	mg/l	0.05	<0.01	0.01
14	Lead as Pb	APHA (22 nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01
15	Manganese as Mn	APHA (22 nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01
16	Iron as Fe	IS 3025(P-53):2003, RA 2019	mg/l	0.14	0.05	0.12
17	Cadmium as Cd	APHA (22 nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01
18	Nickel as Ni	APHA (22 nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01
19	Copper as Cu	APHA (22 nd Edition) 3111 B	mg/l	0.01	<0.01	<0.01
20	Total Chromium as Cr	APHA (22 nd Edition) 3111 B	mg/l	<0.01	<0.01	<0.01
21	Phenolic Compound as C ₆ H ₅ OH	APHA (22 nd Edition) 5530 C	mg/l	<0.001	<0.001	<0.001
22	Mercury as Hg	APHA (22 nd Edition) 3112 B	mg/l	<0.001	<0.001	<0.001
23	Selenium as Se	APHA (22 nd Edition) 3114 B	mg/l	<0.01	<0.01	<0.01
24	Arsenic as As	APHA (22 nd Edition) 3114 B	mg/l	<0.01	<0.01	<0.01
25	Cyanide as CN	APHA (22 nd Edition) 4500 B	mg/l	<0.01	<0.01	<0.01
26	Anionic detergents as MBAS	Annex K of IS:13428	mg/l	<0.001	<0.001	<0.001
27	Mineral Oil	APHA (22 nd Edition) 5520 B	mg/l	<0.01	<0.01	<0.01
28	Aluminum as Al	APHA (22 nd Edition) 3111 D	mg/l	<0.01	<0.01	<0.01
29	Boron as B	APHA (22 nd Edition) 4500B-B	mg/l	<0.1	<0.1	<0.1



30	Dissolved Oxygen	APHA (22 nd Edition) 4500 DO C	mg/l	5.16	6.7	5.96
31	Biochemical Oxygen Demand	IS 3025(P-44):1993, RA 2019	mg/l	42.65	53.97	33.54
32	Chemical Oxygen Demand	IS 3025(P-58):2006, RA 2017	mg/l	163.88	229.44	147.5
33	Total Suspended Solid	IS 3025(P-17):1984, RA 2017	mg/l	112.65	34.55	43.58
34	Total Coliform	APHA (22 nd Edition) 9221 D	MPN/100 ml	920	1600	2400
35	<i>Escherichia Coli</i>	APHA (22 nd Edition) 9221 D	MPN/100 ml	500	900	1600

5.2.6.5 Interpretation of Surface Water

The results obtained for the collected samples indicate that the surface water quality was found to be well within the prescribed standards limit (Class C). The analysis results indicate that pH of the surface water is in range of 7.09 to 7.21. The TDS were found to be in the range of 592.70 mg/l to 1247.50 mg/l, Dissolved Oxygen (5.16 mg/l to 6.7 mg/l), BOD (33.54 mg/l to 53.97 mg/l).

5.2.7 Air Environment

The ambient air quality surrounding the area forms the baseline information. The various sources of air pollution in the region are dust rising from unpaved roads, vehicular traffic, other industries, etc.

The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality in future.

The baseline status of the air quality has been assessed through a scientifically designed ambient air quality monitoring network based on the following considerations:

- Meteorological conditions on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status;

The ambient air monitoring has been carried out with a frequency of two days in a week at eight locations covering one complete season.



Table: 5.8 Sampling Frequency

S. No.	Parameters	Sampling Frequency
1	PM10	24 hourly sample twice a week for two weeks
2	PM2.5	24 hourly sample twice a week for two weeks
3	Sulphur dioxide (SO ₂)	24 hourly sample twice a week for two weeks
4	Oxides of Nitrogen (NO _x)	24 hourly sample twice a week for two weeks
5	Carbon mono oxide (CO)	8 hourly sample twice a week for two weeks

5.2.7.1 Instruments Used for Sampling

Fine Particulate Samplers (FPS) has been used for PM_{2.5} Sampling. Respirable Dust Samplers (RDS) with gaseous attachment have been used for PM₁₀ Sampling. RDS with Gaseous attachment assembly is used for the collection of gaseous pollutants such as SO₂ & NO_x and CO.

Table: 5.9 Ambient Air Monitoring Instruments

Name of Instrument	Make	Model	Range (PM10/PM2.5)	Range (Gases)
Respirable Dust Sampler (PM ₁₀)	Envirotech	APM-460BL	0.02-2.5 m ³ /min	0 -3 lpm
Fine Particulate Sampler (PM _{2.5})	Envirotech	APM-550-Mini	16.7 lpm	N.A

Table: 5.10 Analytical Techniques Used for Ambient Air Quality Monitoring

S. No.	Parameter	Technique	Technical Protocol
1	PM ₁₀	Cyclonic Flow Technique	IS 5182 PART 23:2006
2	PM _{2.5}	Cyclonic Flow Technique	SOP NO. 10/25 ISSUED DATE: 01.03.2010 REVISION DATE: 01.06.2013
3	Sulphur Dioxide	Spectrophotometry	IS 5182 PART 2:2001 (reaffirmed in 2017)
4	Nitrogen Oxide	Spectrophotometry	IS 5182 PART 6:2006 (reaffirmed in 2017)
5	Carbon Monoxide	Gas Chromatography	IS 5182 PART 10: 1999 (reaffirmed in 2019)
6	Ozone (O ₃)	Spectrophotometry	IS 5182 (P-09) 1974 (reaffirmed in 2019)
7	Lead (pb)	Atomic Absorption Spectrophotometry	IS 5182 (P-22) 2004 (reaffirmed in 2019)
8	Ammonia	Spectrophotometry	IS 5182 (P-25) 2018
9	Benzene	Gas Chromatography	IS 5182 PART 11: 2006 (reaffirmed in 2017)
10	Benzo (a) Pyrene	Gas Chromatography	IS 5182 PART 12: 2004 (reaffirmed in 2019)
11	Arsenic	Atomic Absorption Spectrophotometry	As per CPCB guidelines
12	Nickel	Atomic Absorption Spectrophotometry	IS 5182 P-26: 2020

Table: 5.11 Statistical Summary of Concentration Levels of Criteria Pollutants for Kukas & Brahmapuri
(Unit: - ug/m³)



Parameters	Kukas				Brahmapuri			
	31-10-2022	03-11-2022	07-11-2022	10-11-2022	31-10-2022	03-11-2022	07-11-2022	10-11-2022
PM ₁₀	104.65	112.36	100.95	93.42	108.36	122.96	114.82	109.36
PM _{2.5}	58.43	61.28	54.38	49.81	59.2	65.73	62.14	60.14
SO ₂	13.24	14.84	12.93	11.56	14.63	15.42	13.85	12.63
NO _x	39.62	40.25	38.24	33.92	37.25	43.56	38.95	36.62
CO	0.68	0.72	0.7	0.66	0.73	0.78	0.75	0.77
Ozone	31.58	34.94	32.85	33.27	29.75	31.58	33.68	36.42
Lead	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.
Ammonia	14.28	21.23	19.15	17.37	26.84	33.54	30.45	32.55
Benzene	1.12	1.08	1.36	0.98	1.54	1.59	1.57	1.55
Benzo (a) Pyrene ug/m3	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.
Arsenic ug/m3	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.
Nickel ug/m3	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.

Table: 5.12 Statistical Summary of Concentration Levels of Criteria Pollutants for VKIA Area

Parameters	Vishwakarma Industrial Area			
	31-10-2022	03-11-2022	07-11-2022	10-11-2022
PM ₁₀	128.45	186.54	195.43	179.86
PM _{2.5}	70.56	91.52	94.28	84.23
SO ₂	18.42	20.54	21.47	19.37
NO _x	45.96	52.43	53.72	50.42
CO	0.95	1.09	1.12	1.11
Ozone	55.43	58.96	52.94	50.39
Lead	N.T.	N.T.	N.T.	N.T.
Ammonia	39.28	43.69	45.73	42.46
Benzene	2.17	2.96	3.14	3.04
Benzo (a) Pyrene ug/m3	N.T.	N.T.	N.T.	N.T.
Arsenic ug/m3	N.T.	N.T.	N.T.	N.T.
Nickel ug/m3	N.T.	N.T.	N.T.	N.T.

5.2.7.2 Observations

The observations based on a perusal of the results for study period are summarized below:



5.2.7.2.1 Particulate Matter (PM₁₀)

The maximum value for PM₁₀ observed at Vishwakarma Industrial Area as 195.43 µg/m³ and minimum value for PM₁₀ was observed at Kukas as 93.43 µg/m³. The 24 hours applicable limit as per CPCB for industrial, Residential Rural and Other Areas is 100 µg/m³. The baseline value of PM₁₀ exceeds the CPCB limit during the monitoring.

5.2.7.2.2 Particulate Matter (PM_{2.5})

The maximum value for PM_{2.5} observed at Vishwakarma Industrial Area as 94.28 µg/m³ and minimum value for PM_{2.5} at Kukas as 49.81 µg/m³. The 24-hours applicable limit as per CPCB for industrial, residential, rural and other areas is 60µg/m³. The baseline value of PM_{2.5} exceeds the CPCB limit during the monitoring at Vishwakarma Industrial Area and Brahmapuri.

5.2.7.2.3 Sulphur Dioxide (SO₂)

The maximum value for SO₂ observed at Vishwakarma Industrial Area as 21.47 µg/m³ and minimum value for SO₂ observed at Kukas as 11.56 µg/m³. The 24-hours applicable limit as per CPCB for industrial, residential, rural and other areas is 80 µg/m³. The baseline value of SO₂ is within the specified limit of CPCB.

5.2.7.2.4 Nitrogen Dioxide (NO₂)

The maximum value for NO_x observed at Vishwakarma Industrial Area as 53.72 µg/m³ and minimum value for NO_x at Kukas as 33.92 µg/m³. The 24-hours applicable limit as per CPCB for industrial, residential, rural and other areas is 80 µg/m³. The baseline value of NO₂ is within the specified limit of CPCB.

5.2.7.2.5 Carbon Monoxide (CO)

The maximum value for CO observed at Vishwakarma Industrial Area as 1.12 mg/m³ and minimum value for CO at Kukas as 0.66 mg/m³. The 8-hours applicable limit as per CPCB for industrial, residential, rural and other areas is 2 mg/m³. The baseline value of CO is within the specified limit of CPCB.

5.2.7.2.6 Ozone (O₃)

The maximum value for ozone observed at Vishwakarma Industrial Area as 58.96 µg/m³ and minimum value for Ozone at Brahmapuri as 29.75 µg/m³. The 8-hours



applicable limit as per CPCB for industrial, residential, rural and other areas is $100 \mu\text{g}/\text{m}^3$. The baseline value of Ozone is within the specified limit of CPCB.

5.2.7.2.7 Ammonia (NH_3)

The maximum value for ammonia is observed at Vishwakarma Industrial Area as $45.73 \mu\text{g}/\text{m}^3$ and minimum value for ammonia at Kukas as $14.28 \mu\text{g}/\text{m}^3$. The 24-hours applicable limit as per CPCB for industrial, residential, rural and other areas is $400 \mu\text{g}/\text{m}^3$. The baseline value of ammonia is within the specified limit of CPCB.

5.2.7.2.8 Benzene (C_6H_6)

The maximum value for benzene is observed at Vishwakarma Industrial Area as $3.14 \mu\text{g}/\text{m}^3$ and minimum value for benzene at Kukas as $0.98 \mu\text{g}/\text{m}^3$. The annual limit as per CPCB for industrial, residential, rural and other areas is $5 \mu\text{g}/\text{m}^3$. The baseline value of benzene is within the specified limit of CPCB.

5.2.7.3 Interpretation of Ambient Air Quality Data

- Based on comparison study of results for tested parameters with NAAQS, it is interpreted that all parameters in ambient air quality of studied locations are well within the permissible limits as prescribed by CPCB except PM_{10} and $\text{PM}_{2.5}$.
- During the baseline air quality assessment, PM_{10} and $\text{PM}_{2.5}$ were observed to be higher than the limit at all locations around the Sanctuary (industrial, urban and rural area). There may be factor because higher PM_{10} and $\text{PM}_{2.5}$, like higher vehicular traffic in industrial and rural area, use of fossil fuels in the industrial area and urban area, scanty plantation due to urbanization.

5.2.7.4 Mitigation to Improve Ambient Air Quality

- Inventorization of high air polluting industries and upgradation of APCM, if required.
- Increased Plantation along industrial and city roads.
- To improve city transport service to reduced vehicular traffic on road.
- Encourage to use more green fuel.
- Encourage city population for more renewable source of energy



5.2.8 Noise Environment

The environmental assessment of noise from the proposed project activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive landuse, which determines the loudness and period of exposure.

The main objective of noise monitoring in the study area is to establish the baseline noise levels.

5.2.8.1 Method of Monitoring

Sound Level Meter data logger measurements were recorded at three locations. The readings were recorded using data logger and integrated representative value for every hour for 24-hours is completed using software. The day noise levels have been monitored during 6 am to 10 pm and night noise levels during 10 pm to 6 am at all the locations covered in the study area. Measured noise level displayed as a function of time provides a useful information for describing the acoustical climate of a community. Noise levels recorded at each station are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels.

Table: 5.13 Noise Measuring Instrument

Name of Instrument	Make	Model	Range
Sound Level Meter	Envirotech	SLM-100	35-120 dB(A)

5.2.8.2 Ambient Noise Level Data

The statistical analysis is done for measured noise levels at eight locations in the study area. The parameters are analyzed for L-day and L-night. The statistical analysis results are given in table below:



Table: 5.14 Ambient Noise Levels in the Study Area

S. No..	Date	Area Type	Day Time	Night Time
	Vishwakarma Industrial Area			
1	31/10/2022	Industrial Area	64.5	47.2
2	3/11/2022		63.2	48.3
3	7/11/2022		65.4	49.2
4	10/11/2022		64.0	46.5
	Brahmapuri			
5	31/10/2022	Residential	62.8	49.5
6	3/11/2022		63.2	48.2
7	7/11/2022		61.7	45.0
8	10/11/2022		64.2	47.3
	Kukas			
9	31/10/2022	Residential	60.4	46.2
10	3/11/2022		59.4	45.3
11	7/11/2022		62.8	44.5
12	10/11/2022		61.3	45.7

Standards	Day Time (6.00 AM to 10.00 PM)	Night Time (10.00 PM to 6.00 AM)
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

5.2.8.3 Observations

5.2.8.3.1 Day Time Noise Levels (Leqday)

During day time, maximum noise levels recorded were from 65.4 Leq dB(A) and 64.2 Leq dB(A) in industrial and residential area respectively. The minimum value 63.2 Leq dB(A) and 59.4 Leq dB(A) in industrial and residential area respectively.



5.2.8.3.2 Night time Noise Levels (Leqnight)

During night time, maximum noise levels recorded were from 49.2 Leq dB(A) and 49.5 Leq dB(A) in industrial and residential area respectively. The minimum value 46.5 Leq dB(A) and 44.5 Leq dB(A) in industrial and residential area respectively.

5.2.8.4 Interpretation of Noise Data

Based on noise level data obtained during the survey for residential, and industrial area, it is interpreted that noise levels during day and night time are within the standard norms prescribed by CPCB for industrial area, while for residential area the noise level is slightly above the CPCB limit during day and night time. Looking towards the increase in noise generating sources it is suggested that there is need to apply noise reducing devices at noise generating sources and generate public awareness.

5.2.9 Photographs of Baseline Monitoring

Photographs of Ambient Air Monitoring - Vishwakarma Industrial Area



Photographs of Ambient Air Monitoring - Brahmapuri



Photographs of Ambient Air Monitoring – KUKAS



Photographs of Ambient Noise Monitoring Vishwakarma Industrial Area



Photographs of Ambient Noise Monitoring - Brahmapuri



Photographs of Ambient Noise Monitoring -KUKAS



Photographs of Water Sampling



Location: Vishwakarma Industrial Area

Location: Brahmapuri



Location: Kukas



Location: Achrol



Location: Swarna Jayanti Park



Location: Maotha Lake, Amer



Location: Man Sagar Lake

Photographs of Soil Sampling

 Latitude: 26.987149 Longitude: 75.780787 Elevation: 471.36±5 m Accuracy: 4.0 m Time: 03-11-2022 17:06 Note: near JRK INDUSTRIES soil	 Latitude: 26.935358 Longitude: 75.824982 Elevation: 428.66±6 m Accuracy: 6.7 m Time: 03-11-2022 14:59 Note: BRHAMPURI SHIV TEMPLE soil
Location: Vishwakarma Industrial Area	Location: Brahmapuri
 Latitude: 27.037828 Longitude: 75.891093 Elevation: 407.88±17 m Accuracy: 3.9 m Time: 03-11-2022 18:50 Note: kukas soil	 Latitude: 27.088488 Longitude: 75.947015 Elevation: 438.75±9 m Accuracy: 3.9 m Time: 03-11-2022 18:25 Note: achrol soil
Location: Kukas	Location: Achrol

5.2.9.1 Recommendations

- Plantation of thick green belt on periphery of ESZ will be created by using local and native species.
- During the development activities, AAQS (emission of pollutants like PM₁₀ and PM_{2.5}) will be maintained as per CPCB and MoEF&CC Guidelines.
- Strictly restrict the hunting and poaching activities near the ESZ area.
- Installation of sign boards for anti- poaching activities and Wildlife Protection Act Enforcement.
- No forest resources (fuel wood, stones oil etc.) will be utilized from the surrounding the Nahargarh Wildlife Sanctuary and its Eco-Sensitive Zone.

5.3 Site Specific Solid Waste & Sewerage Condition,

Nahargarh ESZ area has almost insignificant areas under waste management and a very limited area is served by a sewer network. Detailed status and analysis are as under.

5.3.1 Solid Waste Management

Socio-economic conditions i.e., education level, family income, occupation and household size play a significant role in Municipal Solid Waste (MSW) generation in society. The study of the Indian scenario regarding these factors divided society into five socio-economic groups (SEG) based on the below mentioned four factors (Figure 5.2).

It concluded that middle and lower middle SEG has the highest per capita waste generation due to comparatively more family members. A comprehensive study of waste composition in different SEGs shows high food and plastic wastes generation from higher SEG, whereas lower SEG generates lesser food waste due to different standard of living.

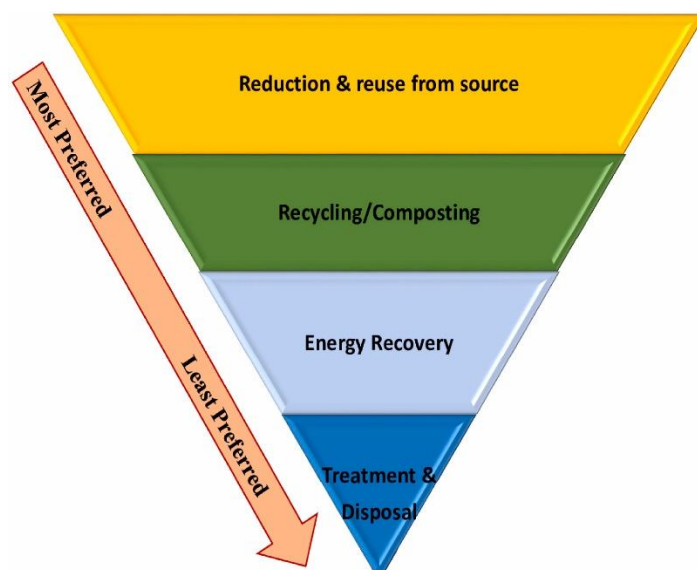


Figure No.: 5.2 Hierarchy of Integrated Solid Waste Management

Figure 5.2 shows a four-tiered integrated solid waste management hierarchy to guide Municipal Solid Waste Management (MSWM) decision-making according to the type of waste. Knowledge of the composition of Municipal Solid Waste (MSW) is important for selecting suitable waste processing and disposal practices since MSW volume and its composition differs considerably with the places having changes in food habits, cultural traditions, lifestyles, socio-economic conditions, and climate. Integrated MSWM based on varying MSW composition is required to recover materials, compost and

renewable energy from MSW and residues to reduce the quantity of MSW reaching landfill sites.

5.3.1.1 Solid Waste Management Scenario of Jaipur:

Jaipur city having 3.04 million population, is the capital of Rajasthan state where a rise in infrastructure development and living standards has led to waste generation amounting to 1000 tons per day (TPD) this quantity of waste is one-third of the total waste generated by the entire Rajasthan state. The physical composition of municipal solid waste in Jaipur city can be depicted in the table below:

Table: 5.15 Physical composition (%) of MSW in Jaipur City

Composition of MSW			
Compostable (%)	Recyclable (%)	Ash, Debris (%)	Carbon-Nitrogen Ratio
45	12	43	43.29

Source: Renewable and Sustainable Energy Reviews (Volume 152, Dec 2021)

5.3.1.2 Municipal waste management in Jaipur city

The MSW composition may vary according to the lifestyle and eating habits of citizens, food resources as well as the climate of the city. MSWM model of one city cannot be implemented as it is in another city of India due to varying climate conditions and lifestyle which changes drastically in India.

Jaipur city, the capital of Rajasthan the largest state of India, is one of the future smart cities of India and is famous for its tourism and hospitality. In 2019, the city has been declared a UNESCO world heritage site. Jaipur is a major city in North India along with Delhi, Kanpur and Lucknow with a high waste generation rate. With an area of 467 km² and the entire city is divided into 91 wards. Since 2011, the wards are distributed in 8 Municipal Corporation zones: Vidhyadhar Nagar, Civil Lines, Mansarovar, Sanganer, Moti Dungri, Hawa Mahal East, Hawa Mahal West and Amer. Jaipur Municipal Corporation (JMC) has the constitutional responsibility of collection, transportation, treatment and safe disposal of MSW generated in the city. Currently, Jaipur city has MSW flow in its management process as shown in Figure 5.3.

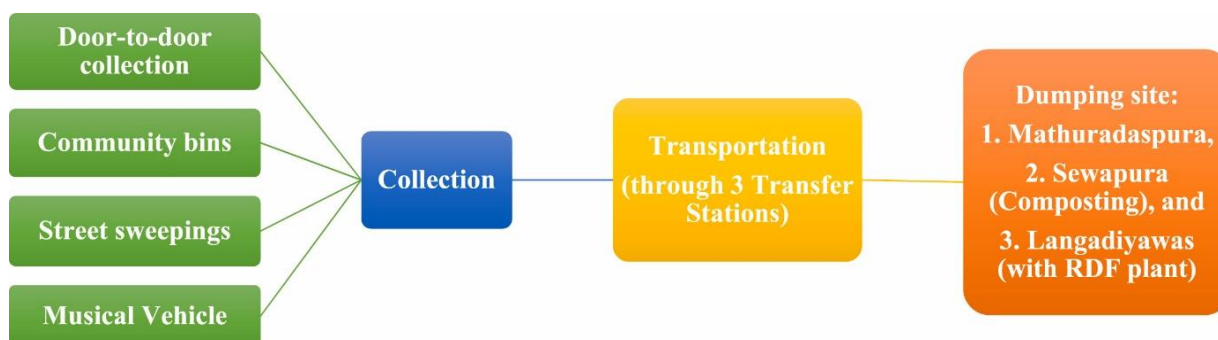


Figure No.: 5.3 MSW Flow of Jaipur

MSW in Jaipur comprises three key components:

1. **Biodegradable (organic waste):** Food waste, garden waste (grass, fallen leaves and tree trimmings), wood etc.
2. **Recyclable waste:** Paper (paper is classified as organic only when it is tainted by organic material), cardboard, plastics, metals, glass etc.
3. **Inert and other wastes:** Textiles, leather, paints, rubber, multi-laminates, medicines, sanitary products and inert materials (stones, silt, ash and inorganic material).

MSW composition and chemical characteristics viz. moisture content, volatile solids (VS), calorific value and elemental composition etc. of MSW in Jaipur city are shown in Figure 5.4 and Table 5.16 respectively. As shown in Figure 5.4, approximately 45% portion of MSW collected in Jaipur was reported in 2018 to be biodegradable while 43% content was composed of ash and fine earth particles.

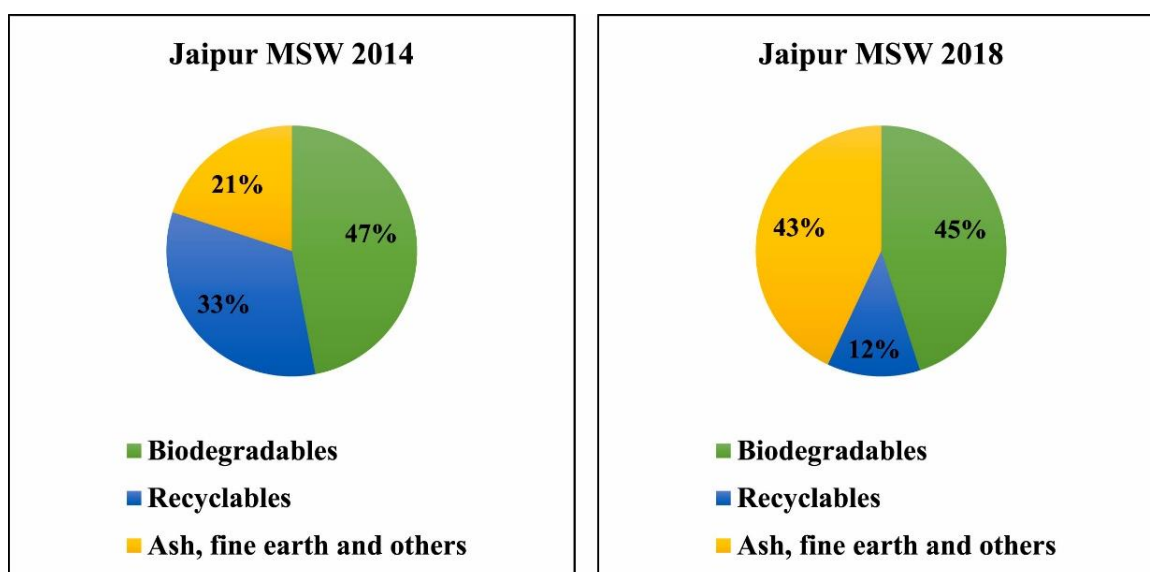


Figure No.: 5.4 MSW composition in Jaipur city in the year 2014 and 2018

Table: 5.16 Chemical characteristics of MSW in Jaipur

Parameters	Moisture	VS	CV (kCal/kg)	C	H	N	S	O	P (P2O5)	Potash K2O
Value (%)	42.7	49.9	1191	28.7	2.9	0.67	0.2	11.9	0.49	0.93

5.3.1.3 Cleaning and collection

Jaipur Municipal Corporation is currently collecting garbage by door-to-door waste collection method. Jaipur city has a collection efficiency of MSW of around 85%. In this collected MSW, 18–24% of contents are recyclable including paper, plastic, rubber, and ferrous and non-ferrous metals. However, 15% of total recyclable waste is collected by rag pickers for their livelihood and traded to scrap buyers informally.

5.3.1.4 Transfer station and transportation

The collected garbage is transported to the secondary storage points or transfer stations and then to the disposal sites using dumper placer and compactor vehicles. Currently, Jaipur has 3 transfer stations at Lal Dungri, Vidhyadhar, and Jhalana having capacities of 400, 250, and 150 TPD respectively. Uncovered or open body type trucks tend to spill waste gradually on the road causing unhygienic conditions on the roads. A vehicle's waste collection frequency is around 2–4 times daily due to the lack of transfer stations in other zones. Therefore, 3 more transfer stations are proposed in Mansarover, Bambala Pulia and Sushilpura to cover the zones which are far away from disposal sites and to minimize the time, money and fuel consumption during waste transportation. The transportation system alone consumes more than 60% of funding from the total fund assigned for the MSWM.

5.3.1.5 Treatment and disposal facilities

For MSW disposal, Jaipur city has currently 3 dumping sites: Mathuradaspora, Langadiyawas, and Sewapura as shown in Figure 5.5 on the Jaipur map and the main features are discussed below:

- 1. Mathuradaspora dumping site:** It is located at a 17 km distance from the main city, having a capacity of up to 400 TPD of MSW with a total area of 0.285 sq. Km.
- 2. Sewapura dumping site:** It is situated 20 km from the city, with a site area of 0.324 km² having a capacity of 300 TPD. It has a compost processing facility of 350 TPD operated by Infrastructure Leasing & Financial Services Limited.

- 3. Langadiyawas dumping site:** It has a total area of 0.782 km² out of which 0.065 km² is allotted for the RDF processing facility and 0.16 km² for Sanitary Landfilling (under construction). M/s Grasim Industries constructed an RDF processing facility producing 150 TPD RDF from 500 TPD MSW at Langadiyawas and transported it to a company UltraTech Cement Limited in Neemuch, Madhya Pradesh, to generate energy for cement production.

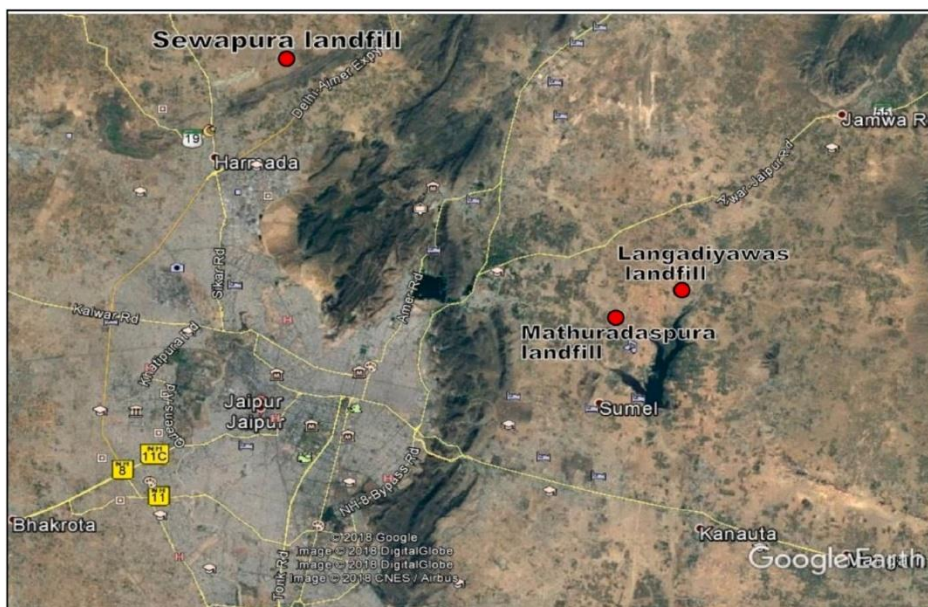


Figure No.: 5.5 the landfill locations in Jaipur city

MSW undergoes many transformations before converting to (Refused Derived Fuel) RDF such as removal of dangerous and large items (i.e., big stones, batteries, dead animals, machines) by workers and then load into pre-shedder to have a granular size of 0–200 mm. Subsequently, the shredded waste is sent into an integrated conveyor installed magnetic separator removing all metals from the waste. Further separation of sand and grit from organic waste is carried out by trommel screen. The heavier pieces like glass and ceramics are passed through the ballistic separator. Thereafter, organic portions are sent for further size reduction up to 0–50 mm, resulting in mixed waste as raw materials for RDF. This garbage for RDF has low calorific value, so plastics purchased from Sainath Enterprises are added. This RDF application in cement plants brings carbon credit to the firm and 9–15% saving on coal burning. This facility recovers 5–6% RDF instead of 30% from MSW received because of the inadequate technology and mixing of construction debris with the MSW.

Currently, a total of 500 MSW TPD i.e., 50% of total MSW treated either as composting or converted into RDF. JMC proposed a waste-to-energy plant in the Mathuradaspura site for the remaining MSW which is being disposed of unscientifically at this moment. Uncontrolled dumping is practised in all 3 disposal sites, prone to leachate production which can cause ground and groundwater pollution and may create vectors for propagating various diseases. Moreover, these sites are without pollution monitoring facilities, proper fencing and fly control [12]. Groundwater from eight sites near Mathuradaspura was sampled and some of them show high content of naturally available fluoride and total dissolved solids which may cause fluorosis and gastrointestinal irritation respectively to the nearby residents [11,12].

5.3.1.6 Solid Waste Management Scenario of ESZ:

MSWM is managed by JMC itself in the majority of the areas falling under ESZ. Door-to-door collection facility is available in the urban areas falling under ESZ. The status of areas/villages served by solid waste collection facility is shown in the table below:

Table: 5.17 Status of availability of Solid Waste Collection

S. No.	Settlements	SWM Facility
1	Achrol	Available
2	Akedadoongar (CT)	Available
3	Amer	Available
4	Ani	Available
5	Bagwada	Not Available
6	Baragaon Jarkhya	Not Available
7	Beer Paper	Available
8	Beer Talera*	Not Available
9	Chhaprari	Not Available
10	Chimanpura (Daab Ka Nala)	Available
11	Daulatpura	Not Available
12	Dhand	Available
13	Gunawata	Not Available
14	Harwar	Available
15	Jaipur (Ganga Vihar Colony)	Available
16	Jaisalya	Available
17	Jaitpur Kheenchee	Not Available
18	Kacherawala (Chokhlawas)	Not Available
19	Khurad	Available
20	Kishanbag	Available

21	Kookas	Available
22	Labana	Available
23	Maila Bagh*	Available
24	Nahargarh	Available
25	Nestiwas	Not Available
26	Seengwana	Not Available
27	Sisyawas	Not Available
28	Vijaymahal & Manpursandva	Available

Source: Primary Survey

From the above table, it can be depicted that approximately 60% of the areas are facilitated by door-to-door garbage collection facilities. Majorly the areas not served by the facility are the villages in the internal part of ESZ. The rest of the unserved areas dump their household waste at garbage collection points in their respective areas which are found in inappropriate condition and need to be taken care of on an immediate basis. The condition of garbage collection points can be seen in the pictures below:



Figure No.: 5.6 Status of Solid Waste within ESZ

The above picture shows the present condition of solid waste management within ESZ. In Figure 5.6, Images 1 & 2 are of Village Achrol which does have the solid waste collection facility provided by JMC, still, the citizens tend to throw the garbage on

the road. The reason behind this scenario is due to the lesser frequency of garbage collection from the area and also the Achrol is the last village of ESZ in the North direction.

In Figure 5.6, Image 3 shows the dumping of municipal waste/ household waste in the open drain. This does not only pollute the water body but also becomes a big reason for many diseases. Immediate action should be taken to avoid such scenarios.

5.3.1.7 Hazardous Waste

Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use, reprocessing, collection, conversion, and offering for sale, destruction, and disposal of Hazardous Waste. These Rules came into effect in 1989 and were amended later in 2000 and 2003 and with final notification of the Hazardous Waste (Management, Handling, and Transboundary Movement) Rules, 2008 in supersession of former notification. The Rules lay down corresponding duties of various authorities such as MoEF, CPCB, State/UT Govts., SPCBs/PCCs, DGFT, Port Authority, and Custom Authority. At the same time, State Pollution Control Boards/ Pollution Control Committees have been designated with wider responsibilities touching almost every aspect of hazardous waste generation, handling, and disposal.

There is no Hazardous waste facility located in this area.

5.3.1.8 Treatment, Storage, and Disposal Facilities (TSDFs)

TSDFs are hazardous waste management facilities for treatment, storage, and disposal (through incineration or secured landfills). Secure Landfill (SLF) are constructed and/or engineered sites where hazardous waste is deposited for final disposal. These sites are designed to minimize the chance of release or impact of hazardous waste on the environment.

5.3.1.8.1 Operational TSDF

It is a TSDF that is currently in use for the disposal of hazardous waste as per the consent of the regulatory agency. Such TSDF can potentially discharge landfill gas, leachate, contaminated surface water, offensive odors, noise, litter, dust and risk of fires during operation.



5.3.1.8.2 Closed TSDF

When a landfill cell of TSDF reaches its maximum designed and consented capacity, it must be closed with a proper cover system as per the procedures laid down under CPCB guidelines. The closed landfill has the potential to release gas and leachate over the years (more than 30 years). TSDF is defined as closed when all the cells are filled and capped, and no more disposal of any waste is practiced. Closure & capping of the last cell and stoppage of incinerator operations in that particular TSDF will be considered as the date of closure of TSDF.

5.3.1.8.3 Buffer Zone

It is a zone that separates TSDF and surrounding landuse. TSDF buffer zone is provided to manage the risk of landfill gas, the release of leachate, and amenity impacts, including odour, noise, dust, and litter, and to manage the risk of effects from unintended events such as slope instability of landfill, liner failure, etc.

5.3.2 E-Waste

E-waste is very diverse and differs in products across different categories. It contains more than 1000 different substances under the “hazardous” and “non-hazardous” types. Broadly, it consists of ferrous and non-ferrous metals, plastics, glass, wood & plywood, printed circuit boards, concrete and ceramics, rubber, and other items. Iron and steel constitute about 50% of the e-waste, followed by plastics (21%), non-ferrous metals (13%), and other constituents. Non-ferrous metals include metals like copper, aluminum, and precious metals, such as silver, gold, platinum, palladium, etc. The presence of elements like lead, mercury, arsenic, cadmium, selenium, hexavalent chromium, and flame retardants beyond threshold quantities in e-waste classifies them as hazardous waste.

Refrigerators and washing machines represent large household appliances, personal computers, monitors, and laptops represent IT and telecom, while television represents consumer equipment. Each of these e-waste items have been classified concerning twenty-six common components, which could be found in them. These components form the “Building Blocks” of each item, and therefore, they are readily “identifiable” and “removable”. These components are metal, motor/compressor, cooling, plastic, insulation, glass, LCD, rubber, wiring/electrical, concrete, transformer,



magnetron, textile, circuit board, fluorescent lamp, incandescent lamp, heating element, thermostat, BFR-containing plastic, batteries, CFC/HCFC/HFC/HC, external electric cables, refractory ceramic fibers, radioactive substances and electrolyte capacitors (over L/D 25 mm). The kinds of components, which are found in refrigerator, washing machine, personal computers (PC) and TVs,

There is no E-waste dumping facility in this area and hence no action is required in this regard for the present.

5.3.2.1 Treatment & Disposal Options

5.3.2.1.1 Landfilling

The literature review reveals that degradation processes in landfills are very complicated and run over a wide time span. At present, it is not possible to quantify environmental impacts from E-waste in landfills for the following reasons:

- Landfills contain mixtures of various waste streams;
- The emission of pollutants from landfills can be delayed for many years;
- According to climatic conditions and technologies applied in landfills (e.g. leachate collection and treatment, impermeable bottom layers, gas collection);

5.3.2.1.2 Incineration

The advantage of incineration of e-waste is the reduction of waste volume and the utilization of the energy content of combustible materials. Some plants remove iron from the slag for recycling. By incineration, some environmentally hazardous organic substances are converted into less hazardous compounds. The disadvantages of incineration are the emission an air of substances escaping flue gas cleaning and a large number of residues from gas cleaning and combustion.

5.3.2.1.3 E-waste Recycling

E-waste recycling centres can be set up following the State E-waste Guideline 2016 of Rajasthan. These authorized centres will collect, inspect and bifurcate waste into reusable, refurbishable and disposable categories. And after the categorization, these wastes should be separated and sent for appropriate processing. This E-waste may



contain many valuable components like circuit boards, precious metals like gold, silver and copper etc. which should be extracted by proper processing and put to reuse.

There is no E-waste processing/dumping site in this area.

5.3.3 Bio-Medical Waste

Biomedical waste is defined as any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto, or in the production or testing of biologicals. Healthcare facilities are primarily responsible for the management of the healthcare waste generated within the facility, including activities undertaken by them in the community. The health facility, while generating the waste is responsible for segregation, collection, in-house transportation, pre-treatment of waste and storage of waste, before such waste is collected by a common waste treatment facility operator. Thus, for proper management of waste in healthcare facilities the technical requirements of waste handling are needed to be understood and practised by each category of the staff.

However, there is bio-medical facility available for Jaipur district which is far away from this area hence no proposal for bio-medical waste needs to be considered.

5.3.4 Plastic Wastes

Plastic products have become an integral part of our daily life. Its broad application is in packaging films, wrapping materials, shopping and garbage bags, fluid containers, clothing, toys, household and industrial products, and building materials. Once the plastic is discarded after its utility is over, it is known as plastic waste. It is a fact that plastic waste never degrades and remains on the landscape for several years. Plastic waste is mostly recyclable, but recycled products are more harmful to the environment as they contain additives and colours. The recycling of virgin plastic material can be done 2-3 times only because after every recycling, the plastic material deteriorates due to thermal pressure, and its life span is reduced. Hence recycling is not a safe and permanent solution for plastic waste disposal. It has been observed that the disposal of plastic waste is a serious concern due to improper collection and segregation systems.



There is no collection & segregation of plastic waste from solid waste in this area. However, use of plastic needs to be checked so that segregation and recycling would not be needed.

Recycling, recovery, or disposal of plastic waste shall be carried out as per the rules, regulations, and standards stipulated by the central government from time to time; recycling of plastics shall be carried out following the Indian Standard IS 14534:1998 titled Guidelines for Recycling of Plastics, as amended from time to time; the Municipal Authority shall be responsible for setting up, operationalization and coordination of the waste management system and for performing the associated functions, namely:-

- a) to ensure safe collection, storage, segregation, transportation, processing, and disposal of plastic waste;
- b) to ensure that no damage is caused to the environment during this process;
- c) to ensure the setting up of collection centers for plastic waste involving manufacturers;
- d) to ensure its channelization to recyclers;
- e) to create awareness among all stakeholders about their responsibilities;
- f) to engage agencies or groups working in waste management, including waste pickers,
- g) to ensure that open burning of plastic waste is not permitted;

5.3.5 Construction and Demolition waste

Demolition wastes are heterogeneous mixtures of building materials such as aggregate, concrete, wood, paper, metal, insulation, and glass that are usually contaminated with paints, fasteners, adhesives, wall coverings, insulation, and dirt. These types of wastes are generated from the complete or selective removal/demolishing of existing structures either by manmade processes or by natural disasters such as earthquakes, floods, hurricanes, etc. (Al-Ansary *et al.*, 2004b), in addition to wastes generated from the renovation and remodeling works.

Construction and demolition (C&D) waste is generated from the construction, renovation, repair, and demolition of houses, large building structures, roads, bridges, piers, and dams. Estimates vary, but a commonly accepted estimate is that between 15% and 20% of municipal solid waste comes from construction and demolition projects.



The following table summarizes the type of waste, legal classification, and examples:

Table: 5.18 Status of type of waste, legal classification, and examples

Type of Waste	Legal Classification in Connecticut	Examples
Land clearing debris	Bulky waste	Tree stumps, tree tops
Demolition waste (from buildings)	Bulky waste	Concrete, wood, brick, plaster, roofing materials, wallboard, metals, carpeting, insulation
Construction waste (from buildings)	Municipal solid waste	Pallets, wood scraps, wallboard, siding and roofing scraps, packaging, carpeting, Foam padding, insulation
Highway construction and demolition waste	Bulky waste, municipal solid waste	Asphalt, concrete, steel, related construction and demolition wastes, utility poles, railroad ties, brick, block, rock
Oversized MSW	Municipal Solid Waste	Furniture, furnishings, carpeting, rugs

At present there is no dumping of construction & demolition waste in this area and hence there is no serious concern at present.

5.3.6 Sewerage

Sewerage is the system for the removal and disposal of sewage and surface water. The majority of the area of Nahargarh ESZ comprises the rural area/forest area. The area connected to urban parts like Shashti Nagar, Amer, Nahargarh, Vijay Mahal Area and the area adjoining the VKIA area in the Western part is well connected with the sewerage system, whereas other rural areas are still using the pit system/ Septic tanks for disposal of their sewage. Areas connected with the sewer network are shown in the table below:

Table: 5.19 Areas connected with the sewer network

S. No.	Settlements	Sewerage Connectivity
1	Amer	Available
2	Jaipur (Ganga Vihar Colony)	Available
3	Jaisalya	Available
4	Kishanbag	Available
5	Nahargarh	Available
6	Vijaymahal & Manpursandva	Available
7	Achrol	Not Available
8	Akedadoongar (CT)	Not Available
9	Ani	Not Available
10	Bagwada	Not Available
11	Baragaon Jarkhya	Not Available
12	Beer Paper	Not Available
13	Beer Talera*	Not Available
14	Chhaprari	Not Available



ECO-Sensitive Zone- Nahargarh

15	Chimanpura (Daab Ka Nala)	Not Available
16	Daulatpura	Not Available
17	Dhand	Not Available
18	Gunawata	Not Available
19	Harwar	Not Available
20	Jaitpur Kheenchee	Not Available
21	Kacherawala (Chokhlawas)	Not Available
22	Khurad	Not Available
23	Kookas	Not Available
24	Labana	Not Available
25	Maila Bagh*	Not Available
26	Nestiwas	Not Available
27	Seengwana	Not Available
28	Seesyawas	Not Available



6. INDUSTRIAL PROFILE OF ESZ NAHARGARH

6.1 Introduction

Rajasthan is India's largest state by area comprising 3.42 lakhs sq.km. covering 25% of its area under the National Capital Region. It has the second largest highway network and about 60% of the DMIC influence zone and 38% of the Dedicated Freight Corridor from the state. The state has the advantage due to its location coefficient enabling approx. 40% of the market of the country. Rajasthan Infrastructure Development Corporation is the body managing all types of industrial activities in the state of Rajasthan. RICCO developed 347 industrial areas across the state comprising 48399 acres of developed industrial land.

6.2 Existing Status of Industrial Area in District Jaipur

Jaipur district has a total of 35 planned industrial areas, comprising of total 7589.46 Hectare area acquired for the development of industries within the district out of which 4943.31 Hectare area has already been developed comprising 9508 plots and having 5830 production units.

Table: 6.1 Existing Industrial Area of Jaipur District

Sl. No.	Name of Industrial Area	Land Developed (in ha)	Total Plots	No. of Vacant Plots	No. of Units in Production
1.	Sitapura Ph I-IV, EPIP, SEZ I, II, Institution Area, Ramchandrapura	1221.72	2304	66	1210
2.	VKIA	998.20	1300	-	1150
3.	VKIA Ext	44.45	165	5	139
4.	Badharna	7.25	36	-	35
5.	Jhotwara	332.55	272	-	272
6.	Jhotwara Ext.-1	90.56	246	33	187
7.	Jhotwara Ext.-11	75.20	549	9	117
8.	Bindavka	102.39	261	4	224
9.	Kartarpura	19.78	241	4	175
10.	Sudarshanpura	23.74	269	-	236
11.	Bais Godam	12.30	184	-	139
12.	Malviva	108.58	289	-	252
13.	Heerawala	107.87	209	14	159
14.	Mansarovar	95.48	292	12	249
15.	Apparel Park, Sitapura	70.16	204	204	-
16.	Gem Park, Sitapura	1.97	2	-	2
17.	Jaitpura	66.16	191	-	191
18.	Rainwal	36.32	155	21	29



19.	Kaladera	234.29	270	21	207
20.	Akeda Doongar	63.75	180	-	30
21.	Phulera	20.60	68	-	29
22.	Kanakoura	50.63	4	-	4
23.	Baaru Old	39.50	150	7	74
24.	Baaru Ext.	131.51	235	-	170
25.	Baaru Ext.-11	165.16	225	1	104
26.	Baaru Chhtroli	109.13	293	291	-
27.	Shahoura	63.78	203	2	151
28.	Dudu	18.45	80	8	37
29.	Manoura Machedi	39.37	52	15	18
30.	Kukas	119.50	51	-	26
31.	Kant Kalwar	267.49	19	10	2
32.	Kilkipura	18.52	6	-	6
33.	Manda	252.90	235	13	-
34.	Baarana	22.91	3	3	-
35.	Bassi	145.43	265	11	206
	Total	4943.31	9508	754	5830

6.3 Industrial Setup around Nahargarh ESZ

There are three industrial areas namely, Vishwakarma Industrial Area (VKIA), VKIA Extension, Akeda Doongar Industrial Area and Kukas Industrial Area developed by RIICO, surrounding the ESZ boundary, which comprises approximately 1226 hectare land.

Table: 6.2 Industrial areas near ESZ boundary

Industrial Area of Jaipur District					
S. No.	Name of Ind. Area	Land acquired (In Ha)	Land developed (In Ha)	Nos. of Plots	No. of Units in Production
1		1399.34	998.2	1300	1150
2	VKIA Ext	73.54	44.45	165	139
3	Akeda Doongar	63.75	63.75	180	30
4	Kukas	164.78	119.5	51	26
	Total	1701.41	1225.9	1696	1345

Vishwakarma Industrial Area alone comprises 85% of the area adjoining to Eco-Sensitive Zone boundary. The major industrial setup around ESZ is situated in Vishwakarma Industrial Area (VKIA). Red, orange and green are all three types of industries running in the VKIA area. The major concern is to avoid a further set of red and orange industries to avoid the degradation of ecology and the environment.

As per the data received from Rajasthan Pollution Control Board, it is found that a total of 303 red industries are currently running in these four industrial areas around ESZ. These industries comprise of coal industry, paint industry and chemical industries

etc. The type of industries available functioning in these industrial areas is given in Table 6.3.

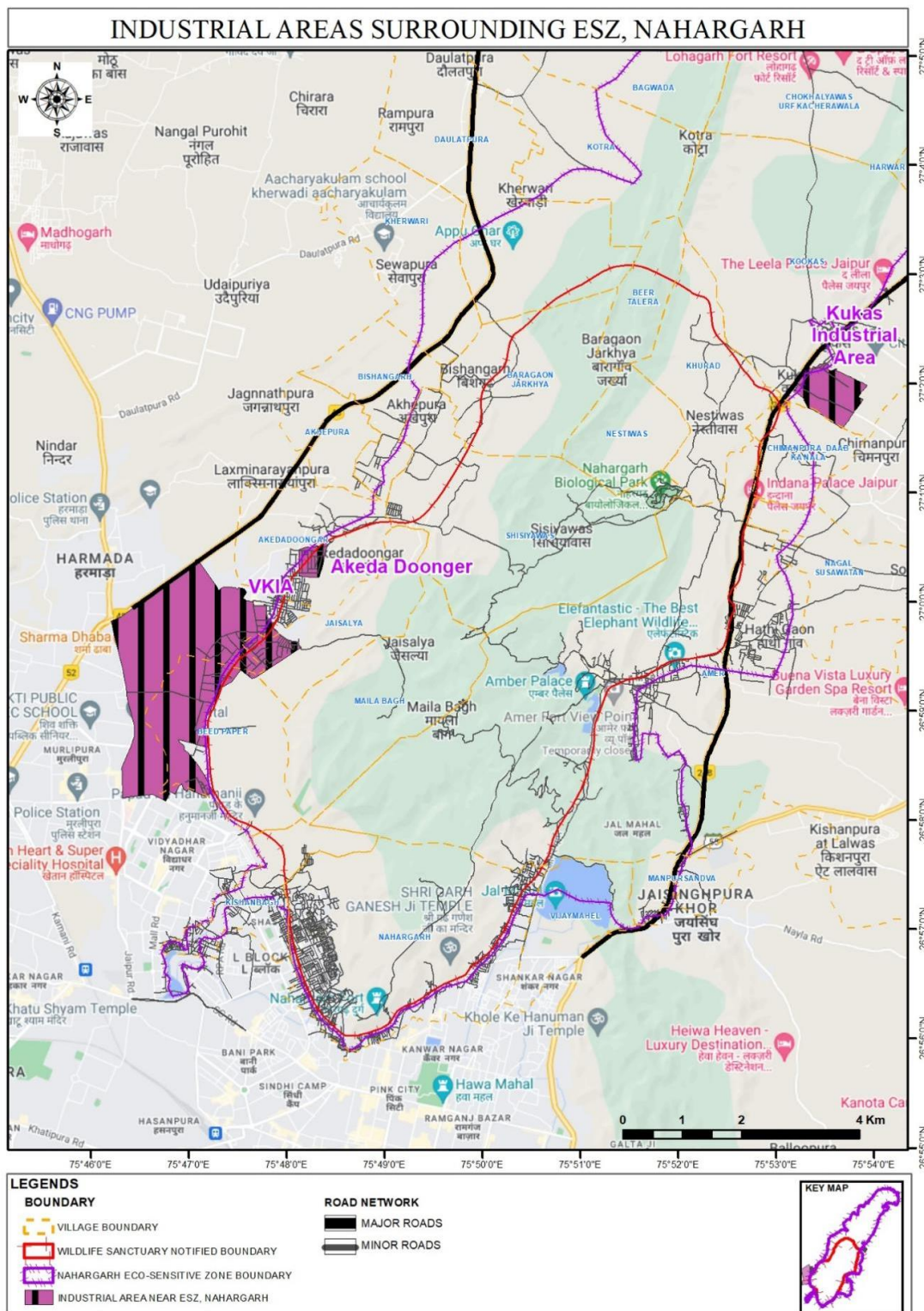


Figure No.: 6.1 Map Showing the Industrial area near ESZ

Table: 6.3 Type of Industries near ESZ Area

S. No	Type of Industries/projects/processes/activities/Mines
1.	Airports and Commercial Air Strips
2.	Aluminium Smelter
3.	Asbestos and asbestos-based industries
4.	Automobiles Manufacturing (Integrated facilities)
5.	Basic chemicals and electro chemicals and their derivatives including the manufacture of acids
6.	Ceramic, Refractories
7.	Cement
8.	Chlor Alkali
9.	Chlorates, perchlorates and peroxides
10.	Chlorine, fluorine, bromine, iodine and their compounds
11.	Coal Washeries
12.	Copper smelter
13.	Coke making, liquefaction, coal tar distillation or fuel gas making
14.	Common treatment and disposal facilities (CETP, TSDF, E-Waste recycling, CBMWTF, Effluent conveyance project, incinerators, Solvent/Acid recovery plant, MSW sanitary landfill sites, STP)
15.	Distillery including the Fermentation industry
16.	Dyes and Dye-intermediates
17.	Dry coal processing/mineral processing, industries involving ore sintering, palletization, grinding, pulverization
18.	Emulsion of oil & water
19.	The fermentation industry includes the manufacture of yeast, beer, the distillation of alcohol (ENA)
20.	Fertilizer (basic) (excluding formulation)
21.	Ferrous and Non-ferrous metal extraction involving different furnaces through melting, refining, reprocessing, casting and alloy making
22.	Fibre glass production and processing (Excluding molding)
23.	Firecrackers manufacturing and bulk storage facilities
24.	Flakes from the rejected PET bottle
25.	Fly ash export, transport and disposal facilities
26.	Health care establishment (As defined in BMW Rules)
27.	Heavy engineering including Ship Building (With investment on Plant & Machineries more than Rs10 Crores)
28.	Hot mix plants
29.	Hotels (3 Star & above) and Hotels having 100 rooms and above
30.	Hydrocyanic acid and its derivatives
31.	Industrial carbon including electrodes and graphite blocks activated carbon, carbon black
32.	Industry or process involving metal surface treatment or process such as pickling/ plating/electroplating/paint stripping/heat treatment/phosphating or finishing and anodizing/ enameling/galvanizing
33.	Iron and Steel (involving processing from ore/integrated steel plants and or Sponge Iron Industries
34.	Isolated storage of hazardous chemicals (as per schedule of Manufacture, Storage & Import of Hazardous Chemicals Rules, 1989 as amended)
35.	Lead acid battery manufacturing (excluding assembling & charging of the acid lead battery in micro-scale [< Rs 25 lakhs])
36.	Lime manufacturing (Using Lime Kiln)
37.	Manufacturing of Explosives, detonators, and fuses including management and handling activities
38.	Manufacturing of Glass
39.	Manufacturing of Glue and gelatin
40.	Manufacturing of Lubricating oils, greases or petroleum-based products
41.	Manufacturing of Paints, Varnishes, pigments and intermediate (excluding blending/mixing)
42.	Manufacturing of Starch/Saggo



43.	Milk processing and dairy products (integrated project)
44.	Mineral stack yards/ Railway sidings
45.	Mining and ore beneficiation
46.	New Highway construction projects
47.	Non-alcoholic beverage (soft drink) & bottling of alcoholic/non-alcoholic products (capital investment on plant & machinery > Rs 1 crore)
48.	Nuclear Power Plants
49.	Oil & Gas extraction including CBM (offshore & onshore extraction through drilling wells)
50.	Oil and gas transportation pipeline
51.	Organic chemicals manufacturing
52.	Oil Refinery (Mineral Oil or Petro Refineries)
53.	Parboiled rice mills (more than 10 TPD)
54.	Pesticides (Technical) (excluding formulation)
55.	Petrochemicals (Manufacture of and not merely use of as raw material)
56.	Pharmaceuticals (excluding formulation)
57.	Pulp and Paper (paper manufacturing with or without pulping)
58.	Phosphate rock processing plant
59.	Phosphorous and its compounds
60.	Photographic films and their chemicals
61.	Ports & Harbors, Jetties and Dredging Operations
62.	Power Generation Plants [Except Wind, Solar and Mini Hydel Power plants of capacity < 25 MW) and DG set of capacity > 5 MVA]
63.	Processes involving chlorinated hydrocarbons
64.	Railway Locomotive workshops/Integrated Road transport workshop/Authorized service centers
65.	Reprocessing of used oils and waste oils
66.	Shipbreaking activities
67.	Slaughterhouses (As per the notification S.O.270 (E) dated 26-03-2001) and meat processing industries, bone mill, processing of animal horns, hoofs and other body parts
68.	Steel and steel products using various furnaces like blast furnaces/open hearth furnaces/induction furnaces/arc furnaces/submerged arc furnaces/basic oxygen furnaces/hot rolling using reheating furnace
69.	Stone crushers
70.	Sugar (excluding Khandsari)
71.	Surgical and medical products involving prophylactics and latex
72.	Synthetic detergents and soaps (excluding formulation)
73.	Synthetic fibers including rayon, tyre cord, polyester filament yarn
74.	Synthetic resins
75.	Synthetic rubber excluding molding
76.	Tanneries
77.	Thermal Power Plants
78.	Tobacco products including cigarettes and tobacco/ opium processing
79.	Vegetable oils including solvent extraction and refinery/ hydrogenated oils
80.	Yarn/textile processing involving any effluent/emission-generating process, bleaching, dyeing, printing and scouring
81.	Zinc Smelter
82.	Aerial ropeway
83.	Clinker grinding unit
84.	Halogenated Hydrocarbons
85.	Heavy water
86.	Ink, Pigment and Intermediates other than formulation
87.	LPG bottling plant
88.	Mineral grinding (except asbestos industries)
89.	Pesticide specific intermediates
90.	Processing of nuclear fuel
91.	River Valley Project



92.	Synthetic leather and related products except isolated molding
93.	Any industry/industrial activity which is not covered in the above list has a coal-fired boiler with a steam generation capacity of more than 5 T/hour.

Source: RIICO, Jaipur

Approximately 4100 hectares of land has been acquired to develop the area, out of which 998.20 hectares has been already developed with 1300 plots developed. A total of 947 industries are set up in VKIA including all large, medium and small-scale industries. Out of the total of 947 industries, only 51 industries are green industries i.e. non-polluting industries, 598 industries fall under the orange category whereas 294 industries fall under red category. The industrial setup near the ESZ area can be depicted on the map below:



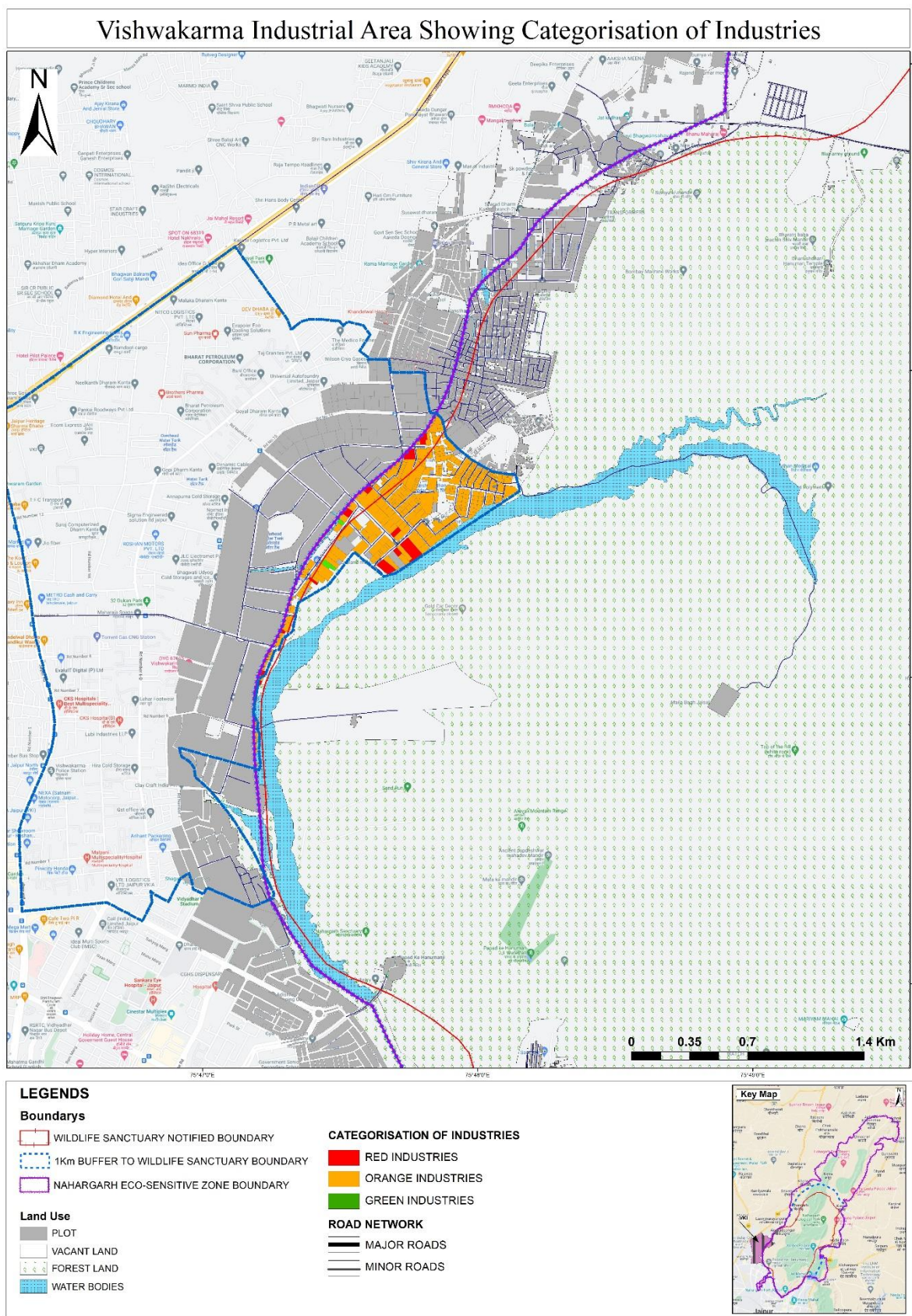


Figure No.: 6.2 Map Showing VKIA Industrial Area near ESZ

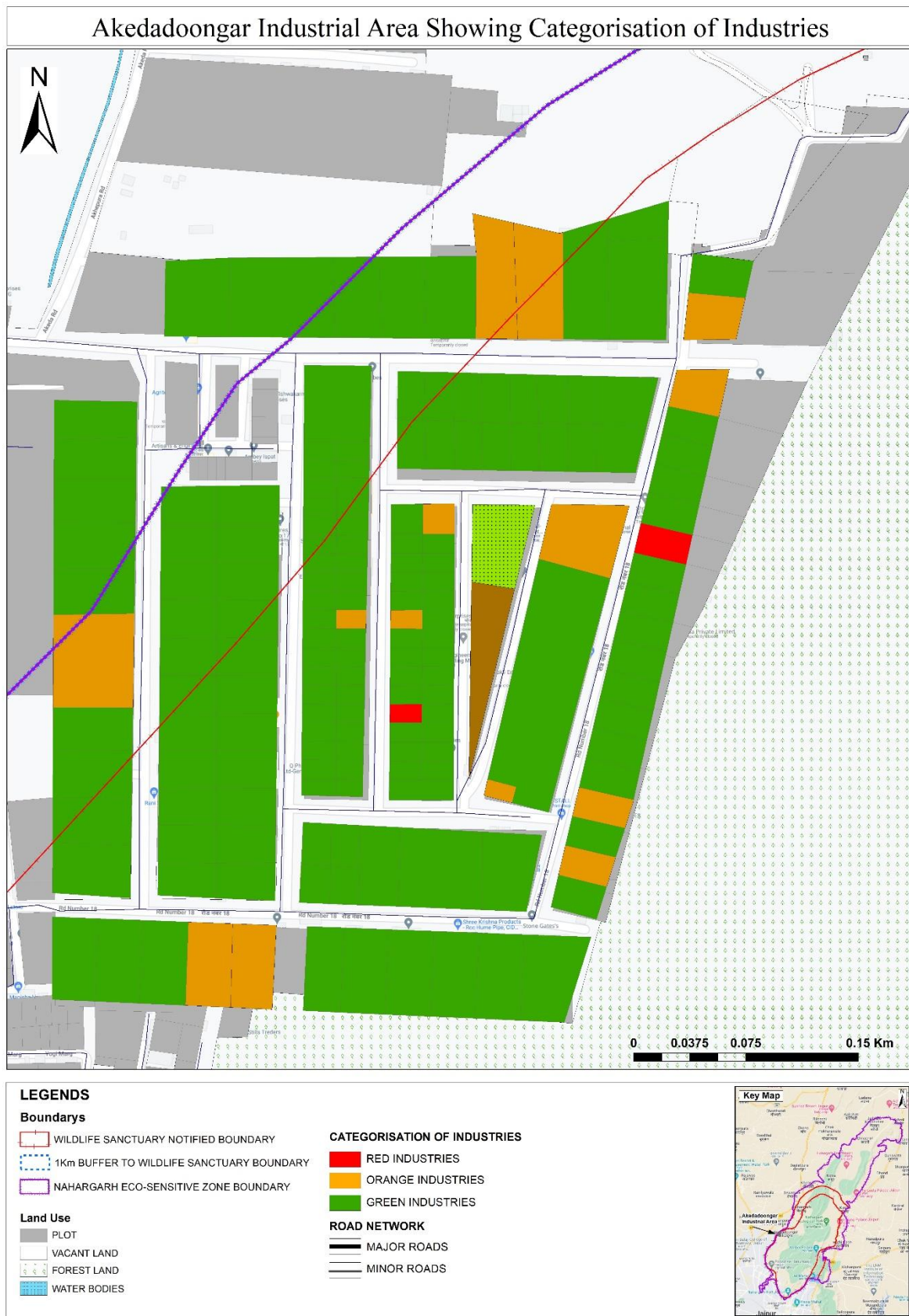


Figure No.: 6.3 Map Showing Akeda Doongar Industrial Area near ESZ

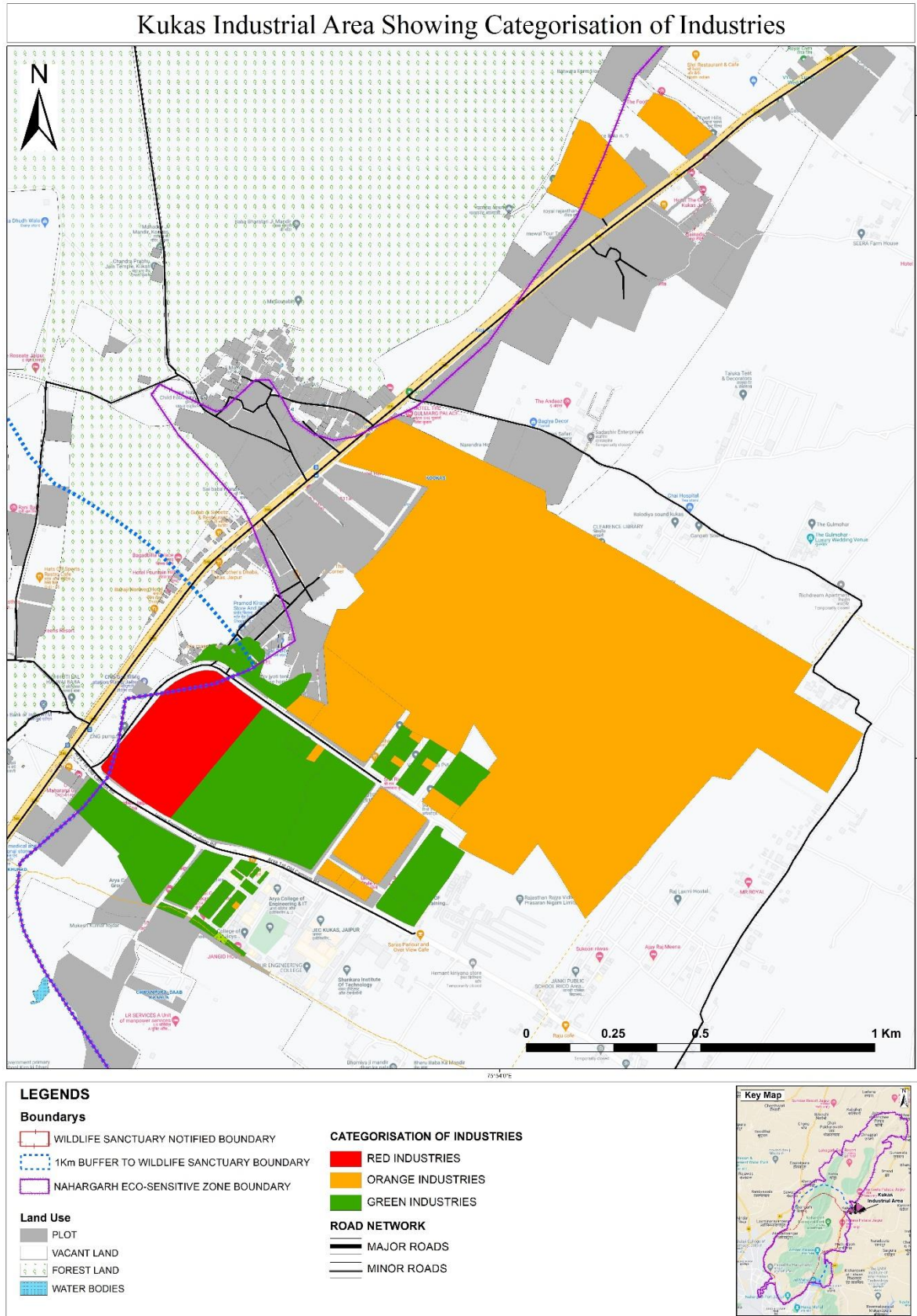


Figure No.: 6.4 Map Showing Kukas Industrial Area near ESZ

7. EXISTING LANDUSE OF NAHARGARH ESZ

7.1 Background

This chapter deals with the current landuse status of the Nahargarh ESZ and development control aspects. Landuse and development control regulations provide the necessary guidelines for physical development proposals.

The total area notified under Nahargarh ESZ has been divided into three parts:

- 1) Wildlife Sanctuary Area (Protected Area), known as Wildlife Sanctuary Zone
- 2) The area lying outside Wildlife Sanctuary Zone but within one kilometer buffer zone around the Wildlife Sanctuary, or ESZ boundary whichever is nearer, is known as Zone 1 B
- 3) Area beyond Wildlife Sanctuary Zone and one kilometer buffer zone (Zone 1B), but within ESZ boundary known as Zone 1 C.

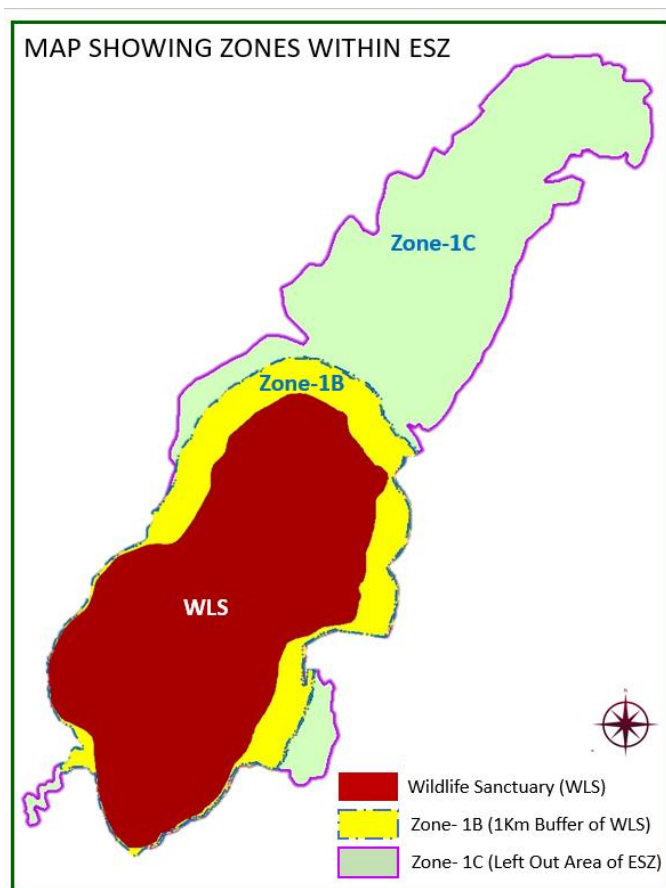


Figure No.: 7.1 Map Showing Zones within ESZ, Nahargarh

7.2 Existing Landuse 2022

A primary survey was conducted using drone imagery data, and ground truthing was done in the year 2022. The total area of Nahargarh ESZ is 7731.07 ha. Table 7.1 below shows the distribution in proposed area as per MDP 2025 Landuse in Nahargarh ESZ Area, where entire ESZ area is categorized as above categories ie, Wildlife Sanctuary, Zone 1B and Zone 1C. Existing Landuse Map is attached in Annexure 3.

Table: 7.1 Existing Landuse in Nahargarh ESZ, 2022 (Area in ha.)

S. No.	Landuse	Area		ESZ Area	Developed Area	WLS
	Zone wise	Zone 1B	Zone 1C	Total	%	Existing
1.	Residential	128.10	86.44	214.54	33.09	134.6
	Special Area	0.76	00.00	0.76	0.12	73.89
2.	Commercial	36.17	25.72	61.89	9.54	23.21
3.	Mixed	5.72	1.97	7.69	1.19	17.25
4.	Industrial	15.11	24.43	39.54	6.10	44
5.	Government	1.39	32.25	33.64	5.19	2.32
6.	Public and Semi Public (PSP)	25.51	9.26	34.77	5.36	78.36
7.	Recreational	9.18	0.41	9.59	1.48	31.59
8.	Circulation	85.40	161.36	246.76	38.06	70.36
	Total Developed Area	306.57	341.85	648.42	100.00	401.69
9.	Vacant Land	204.90	222.69	427.59		95.01
10.	Agriculture	535.10	400.80	935.9	-	417
11.	Water Body	86.36	24.23	110.59	-	91.53
12.	Government Reserved Land	1.19	0.76	1.95	-	4.37
13.	Forest Land+ Hills+ G1+G2+Ecological Area	870.50	4736.12	5606.62	-	5469
	Total	2004.62	5726.45	7731.07	-	6478.6

Source: Primary Survey-2022

7.3 Distribution of Proposed Landuse

Distribution of proposed landuse as per ZDP 2025 in Nahargarh ESZ and WLS area is as under.

Table: 7.2 Distribution of proposed landuse as per ZDP 2025 (Area in ha.)

Landuse	WLS	Zone 1 B	Zone 1 C	ESZ Area	Total Area (ESZ+WLS)
Residential	393.52	657.6	217.35	874.95	1268.35
Special Area	73.89	0.76	0	0.76	74.65
Commercial	5.98	18.15	4.28	22.43	28
Mixed	0	0	1.55	1.55	1.55
Industrial	51.4	20.83	0	20.83	72.23



PSP	31.65	105.2	389.58	494.78	526.43
Recreational	138.08	46.06	73.61	119.67	257.75
Circulation	76.36	102.06	157.35	259.41	335.77
Total Developable Area	770.87	950.66	843.75	1794.41	2565.14
Waterbody	82.04	83.11	75.05	158.16	240.2
Government Reserved	4.37	1.15	0	1.15	5.52
Forest +Hills+G1+G2+Ecological Area	5621.32	969.7	4807.79	5777.49	11398.81
Total	7249.48	2955.28	6570.31	9525.59	16774.4

7.4 Special Area

It is a prerequisite to note that, the old Amer Abadi area has been named as a Special Area in MDP 2025 and has a total area of 74.17 ha, which is a part of the ESZ area. The remaining Special Area is part of the walled city area, which comprises 0.48 ha. Out of the old Amer Special area, 54.11 ha. (72.95%) is a developed area. In this developed area, most prominent use is public & semi-public use, which is 21.66 ha. (48.53 %), followed by residential use 19.35 ha. (35.76 %). Details given in Table 7.3.

Table: 7.3 Distribution of Existing Landuse in Special Area (Old Amer) in ESZ Area (Area in ha.)

S. No.	Landuse	Area (ha)	% of Developed Area	% of Total Special Area
1	Residential	19.35	35.76	26.09
2	Commercial	0.97	1.79	1.31
3	Mixed	2.18	4.03	2.94
4	Industrial	0	0.00	0.00
5	Government	0.45	0.83	0.61
6	Public & Semi-Public	21.66	40.03	29.20
7	Recreational	0	0.00	0.00
8	Circulation	9.5	17.56	12.81
	Total Developed Area	54.11	100	72.95
9	Vacant Land	5.85	-	7.89
10	Water Body	1.45	-	1.95
11	Forest land	12.76	-	17.20
	Total	74.17	-	100.00

Source: Primary Survey, 2022.

Note: Norms/ Regulations regarding Special Area are to be prescribed by JDA/ concerned Urban Local Body.



7.5 Comparative Analysis of Existing and Proposed Landuse in Nahargarh ESZ

The ESZ boundary is superimposed on the proposed landuse map of ZDP (2025). The map illustrates the proposed landuse as per ZDP-2025, which indicates that a significant portion of the area envisaged in the master plan has not yet been developed. According to this analysis, neither the recreational use nor the public and semi-public use anticipated in MDP-2025 has implemented, leaving a deficit of 110.08 ha and 460.01 ha, respectively. More commercial landuse has been suggested in ZDP-2025 than has been proposed for mixed-use and commercial landuse. There are 6.14 ha and 39.46 ha of extra land, respectively.

According to ZDP-2025 recommendations, only 648.42 ha of the total 1794.41 ha developable area has been developed thus far; consequently, 1145.99 ha area remains to be developed according to the Existing Landuse Survey-2022. The comprehensive table is included as Annexures 4, 5, 6. Deviation map is attached in Annexure 7.



PART-B ZONAL MASTER PLAN FOR NAHARGARH ECO-SENSITIVE ZONE



8. ANALYSIS OF NATURAL FEATURES WITHIN ESZ

8.1 Slope Suitability

Slope suitability is one of the integral components of the land suitability analysis. Preparing land suitability analysis, three factors are taken into consideration i.e. soil, forest and slope. The slope of the ESZ has been prepared using Digital Elevation Model (DEM) on GIS platform. The DEM model counts typical contours in analyzing the topography and relief. The relief elevation varies between 329 to 608 meters.

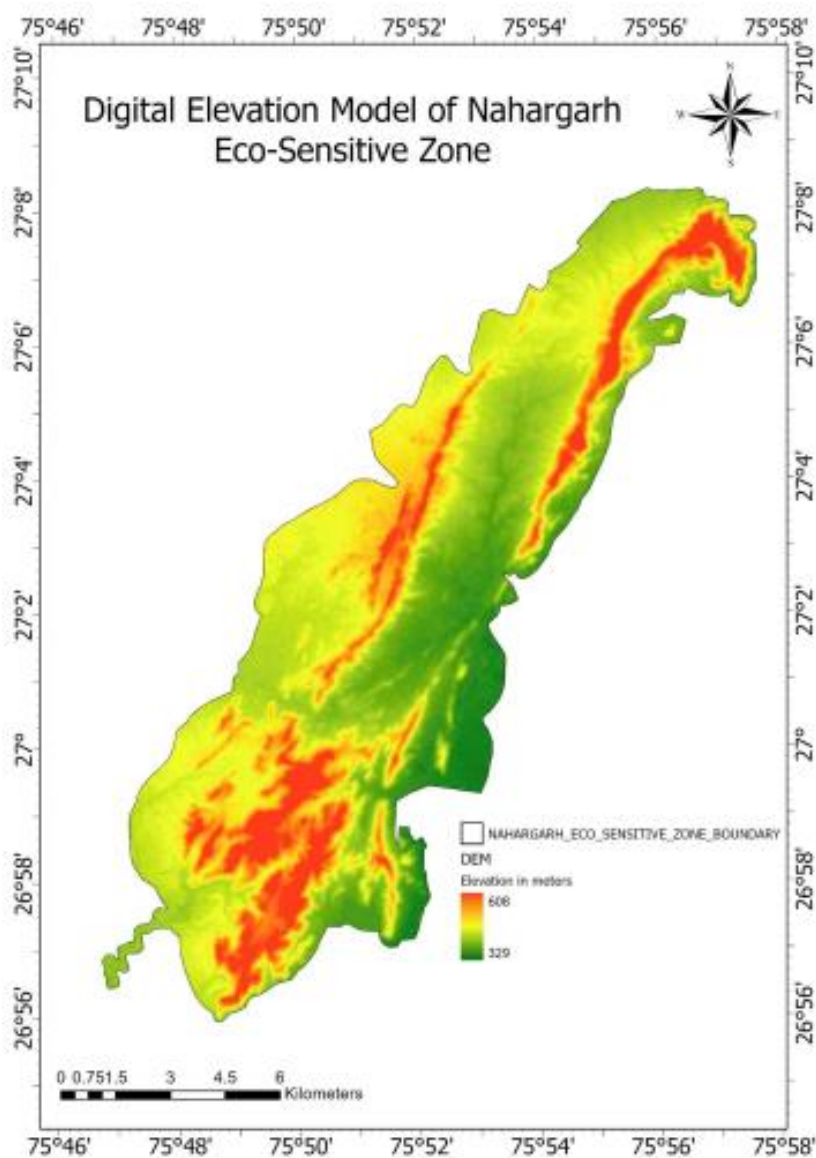


Figure No.: 8.1 Digital Elevation Model (DEM) of Nahargarh ESZ, 2022

Viewing, the slope suitability, the slope of ESZ is divided into five following categories based on steepness topography i.e:

- 1) Very Low Slope: 0-5 Degree
- 2) Low Slope: 5-10 Degree
- 3) Gentle Slope: 10-15 Degree
- 4) Moderate Gentle Slope: 15-20 Degree
- 5) Steep Slope: >20 Degree

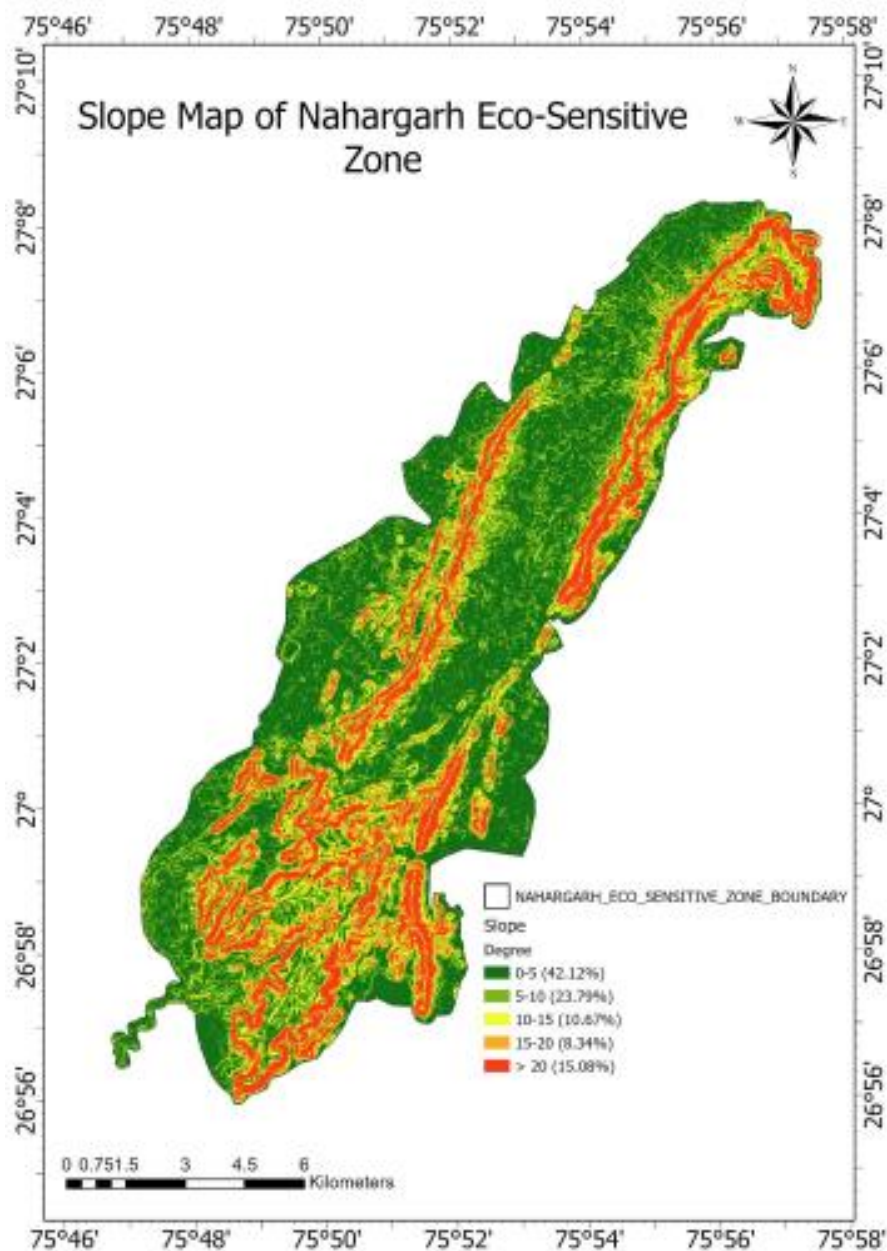


Figure No.: 8.2 Slope of Nahargarh ESZ, 2022

Hilly areas are the most fragile sub-zones of the Nahargarh ESZ. In hill areas of Nahargarh ESZ, no construction more than slope (gradient), having 20-degree inclination should be allowed. On the other hand, slope below than 20-degree may be considered for the development. The specific emphasis should be given to the afforestation ventures in the hilly areas where the soil, and slope suitability meets the favorable. The development promotions and control regulations will be admirable applicable in the ESZ.

8.2 Buffers Zones along Wetlands

There is a total area of 202.12 ha under waterbodies in the Nahargarh ESZ, which is 1.42 percent of the total geographical area of ESZ. It is important to conserve the waterbody and surrounding wetland, hence a buffer of it is proposed around the major waterbodies of the ESZ to enhance the wetland ecosystem around these waterbodies. A major issue arises from the existing development which lies within the buffer zone of water bodies. It is hence clarified that existing development need not be demolished and can be retained as such but no new construction in this buffer zone shall be allowed to take place.

As per MOEF&CC there is no wetland in Nahargarh ESZ Area. However important water bodies of Nahargarh ESZ are important as they support in biodiversity & helping ground water recharge. These identified water bodies are shown in the Figure 8.3 & Annexure- 8.



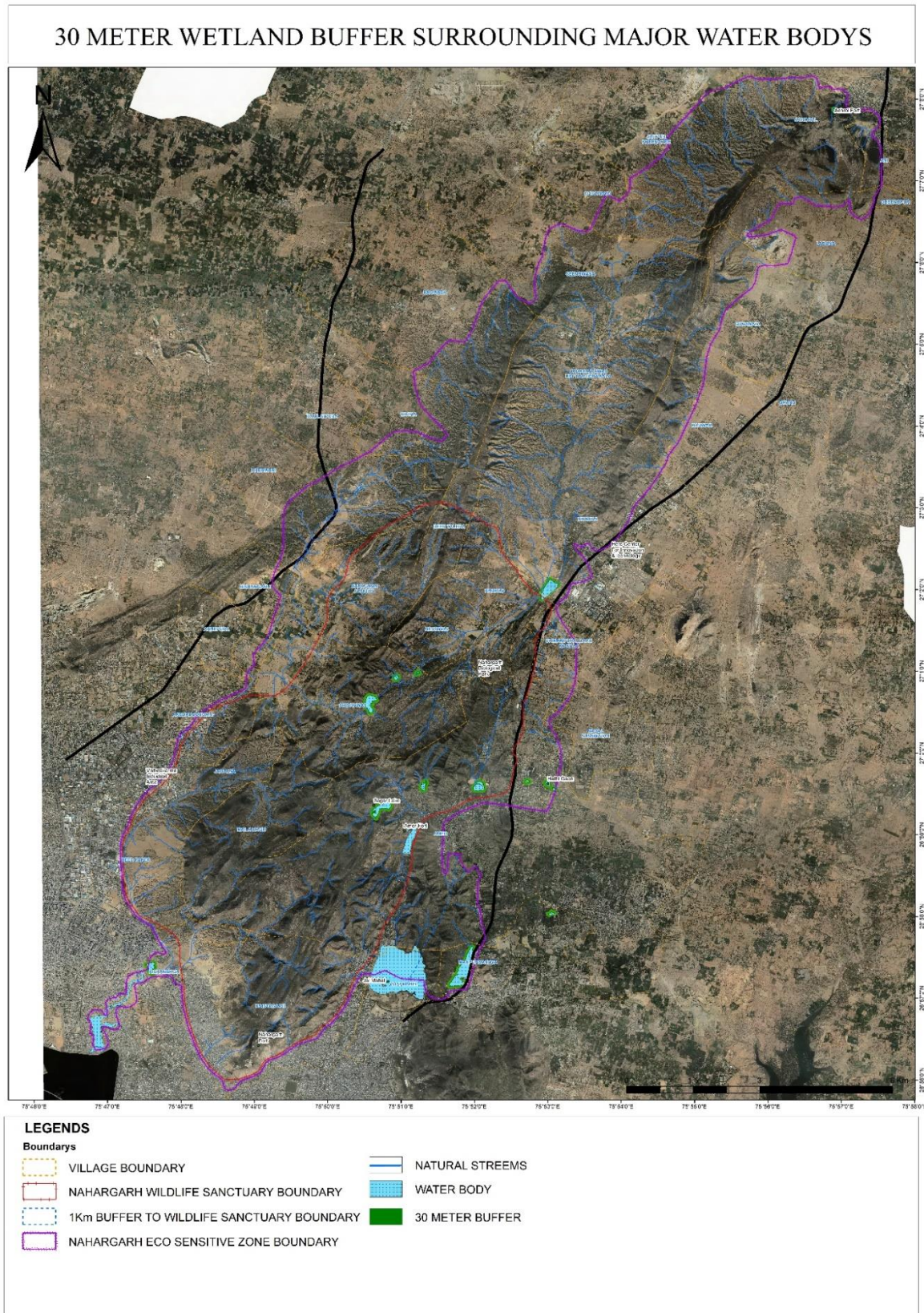


Figure No.: 8.3 Wet Land Buffer Surrounding Major Waterbodies

8.3 Major Water Management Initiatives Needed for ESZ

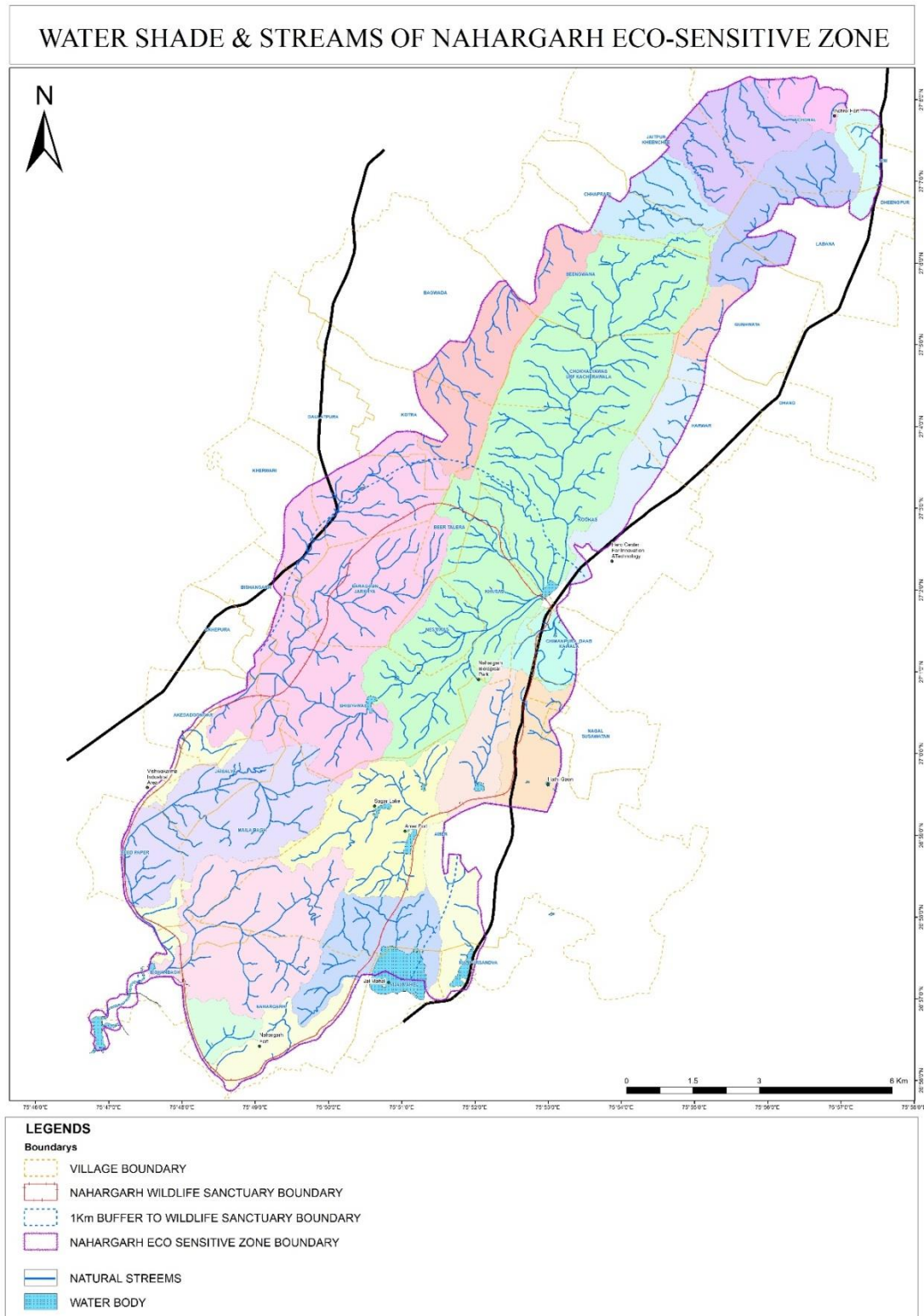


Figure No.: 8.4 Major Water Management Initiatives Needed for ESZ

8.3.1 Water Retention and Recharge

To maintain soil moisture and ground water recharge, earthen embankment of 1 meter height may be proposed in the various parts of ESZ. These embankments will also act as surface water sources for animals. Location of these proposed embankments can be seen in map attached as Annexure 9. This suggestion needs to be examined by forest department and monitoring committee.

8.3.2 Plantation and DEWAT System for Wastewater Management

A wastewater network is incomplete without proper treatment of wastewater before discharging it in the waterbodies or reusing it further. For this purpose, DEWATS system has been preferred. Decentralized Wastewater Treatment Systems (DEWATS) is a simple design, non-dependent on energy, reliable, long-lasting, tolerant towards inflow fluctuation & low in costs. It can treat organic wastewater from domestic and industrial sources. DEWATS is based on different natural water treatment techniques that are combined according to requirements such as the characteristics of wastewater, desired effluent quality and technical specifications. This is especially suitable for villages falling in ESZ area.

Typical DEWATS combine the following technical treatment steps in a modular manner as highlighted below:

- a. Primary treatment – in sedimentation ponds, settlers, septic tanks or bio digester
- b. Secondary treatment – in anaerobic baffled reactors, anaerobic filters or anaerobic and facultative pond systems
- c. Secondary aerobic/facultative treatment – in horizontal gravel filters
- d. Post-treatment – in aerobic polishing ponds

Key features of DEWATS are as follow

- i) Treatment of a wide range of wastewater types at affordable prices
- ii) Fulfilments of discharge standards and environmental laws
- iii) Treatment of wastewater flows from 1-1000 m³ per day
- iv) Tolerance to inflow fluctuation
- v) Resource efficiency and non-dependence on energy
- vi) Minimal maintenance, reliability and longevity
- vii) Re-use of wastewater and its by-products such as biogas and sludge



- viii) Does not require deep sewer line construction
- ix) Can be integrated into the landscape, and
- x) Combinations of aerobic and anaerobic treatment process



9. GUIDELINES & PROPOSALS FOR ECOLOGY AND ENVIRONMENT IN NAHARGARH ESZ

9.1 Introduction

Planning guidelines for ecology provide a framework for integrating ecological considerations into land use planning and development processes. These guidelines aim to promote sustainable development practices that safeguard and enhance the natural environment, biodiversity, and ecological systems.

9.2 Land Suitability Analysis

Land suitability recognizes its ecological significance and an urgent need to control the environmental degrading activities in the area. The current Zonal Master Plan (ZMP) outlines a development pattern for the horizon year 2041, by addressing the various ecological aspects of Nahargarh Eco-Sensitive Zone. The present section describes the land suitability based on identified suitability of the land i.e. agriculture, forest, wildlife, and water.

9.3 Land Suitable for Agriculture

Soil productivity denotes the suitability of the agriculture land. Further, the soil productivity is the subject of gradients available in the local soil. Productivity is also determined by the hardness of the soil substances. In Nahargarh ESZ, soil productivity can be correlated by viewing the LULC map of the ESZ. Viewing the map, the area around the settlement of Jaitpur Kheenchhi, Chparari, Bishangarh, Kookas and Khurad are engaged in the agriculture activity that depict the favorable soil productivity. The area seems as a shrub land in the ESZ depicts the semi-arid (desert) vegetation shows the less soil productivity due to rocky terrain of the area in the ESZ. Evaporation also plays an important role to decide the soil productivity. In case of Nahargarh ESZ, the amount of rainfall is less while evaporation is high, as a result, less moisture content is available to the regional soil, therefore, the productivity is also less in the ESZ. Another, important factor affecting ESZ soil is the degradation by the erosion of the soil due to steep slope in monsoon season every year. The ESZ area around the sanctuary is highly degraded due to loss of soil layer by the annual erosion.



9.4 Land Suitable for Forest

Forest is the lifeline of any ecosystem. In Nahargarh ESZ, the area reserved for the forest, is to be promoted for forest uses only. The promotion of native species reforestation in poor forest areas is necessary. The hilly area which has slope less than 20-degree and currently which having less forest area, should be promoted for the afforestation.

9.5 Land Suitable for Wildlife

The Nahargarh ESZ area boasts an environment that is not only ideal for wildlife but also plays a crucial role in maintaining biodiversity. Promoting the food chain and food web within this area is essential for sustaining a rich and balanced ecosystem. By ensuring the health and interdependence of various species, we can preserve the natural beauty and ecological significance of this region. Additionally, such efforts contribute to the overall well-being of both the native flora and fauna, making it a win-win for conservationists and the environment alike.

9.6 Land Suitable for Water Retention

The important drainage channels have been identified for construction of anicuts/check dams. The ideal locations for construction of check dams would be where the gradient of water channel is less, and large capacity of water can be stored due to availability of water storage area. The topographical suitability of such sites has also been checked with the help of contour map. These water retention structures would help in percolation of water in soil as well as meet the needs of wildlife animals and birds round the year. The Nahargarh Eco-Sensitive Zone (ESZ) and its vicinity in Rajasthan, India, are home to several water bodies that contribute to the region's ecological diversity and support local wildlife. Some of the notable water bodies in and around the Nahargarh ESZ include





Ram Sagar Lake



Artificial water point
Jaigarh Fort



Water Body in the old Amer



Water Bodies in the vicinity of Amer

Figure No.: 9.1 Water bodies in WLS



Man Sagar Lake



Drvyavati River

Figure No.: 9.2 Water bodies in ESZ

These water bodies play a vital role in sustaining the ecosystem within the Nahargarh Eco-Sensitive Zone. They provide drinking water for wildlife, support plant life, and create essential habitats for various aquatic and bird species. The availability of water during off monsoon season is a serious concern for the wildlife animals and birds. Maintaining the health and integrity of these water bodies is essential for the conservation efforts in this sensitive ecological zone. Such check dams will have maximum height of 1 mtr only. Map showing check damas for water retention is attached as Annexure- 9.

9.6.1 Water Environment

Water is a fundamental resource with far-reaching implications for preserving the ecological balance, supporting both human and animal life, and facilitating various

economic and developmental activities. In the context of the Nahargarh Eco-Sensitive Zone (ESZ), water resources hold immense significance, given the delicate ecosystem, the prominence of tourism as a local economic pillar, and the well-being of the region's residents.

The Nahargarh ESZ faces growing demands for water resources, spanning drinking water supply, tourism, commercial enterprises, agriculture, and industrial activities. These activities are pivotal for improving living conditions and generating employment opportunities in the Nahargarh area. However, the escalating demand for water resources has led to their overexploitation, resulting in a severe shortage of water to meet ecological needs. Hence, effective water resources management is paramount for the Nahargarh ESZ's sustainability.

In light of this, several key activities are proposed to promote eco-tourism and address the water resource challenges in the Nahargarh Sanctuary:

- i) **Intensive Drainage Line Treatment and Anicut Construction:** Two major drainage channels within the Sanctuary will be identified for anicut construction at strategic locations. These anicuts will be constructed starting from the top of the drainage lines. Simultaneously, soil and moisture conservation measures such as check dams, contour trenching, and seed sowing will be implemented to treat these drainage lines comprehensively.
- ii) **Ensuring Year-Round Water Availability:** It is imperative to ensure a consistent and adequate water supply throughout the year. This can be achieved by enhancing the water table of the ESZ through rainwater harvesting practices, if possible, maintaining the existing water balance.
- iii) **Conservation of Water Channels and Watershed Development:** Prioritizing the conservation of water channels and the development of watersheds is essential. Constructing check dams up to a height of 1 meter will help store sufficient water to meet the demands of the wildlife and avian population throughout the year.
- iv) **Enhancing Soil Moisture Retention:** Retaining soil moisture is critical for promoting plant growth, which, in turn, aids in preventing soil erosion and facilitating rainwater percolation.



These measures not only address the immediate water resource challenges but also contribute to the overall health and sustainability of the Nahargarh ESZ. Effective water resource management is pivotal in ensuring the long-term balance between ecological preservation, economic development, and the well-being of the local community.

9.6.2 Biotic Environment

Biotic environment deals with floral and faunal components of the Nahargarh ESZ. It should ensure to enhance the food web, food chain, water, plant of native species and variety of plant which are supportive to faunal species of Nahargarh. In this regard following steps can be taken forward:

i) Habitat Improvement

In the Nahargarh Eco-Sensitive Zone (ESZ), several areas within the Nahargarh Wildlife Sanctuary face a significant challenge – the dwindling prey base. This decline can be attributed to high biotic pressure, particularly from the villages situated around the Sanctuary and their cattle population. This biotic interference has led to the degradation of the natural habitat, resulting in low prey density and a sparse carnivore population. Maintaining a sufficient prey base is crucial for the growth and sustainability of large predators like the Panther.

Additionally, various regions of the Sanctuary are heavily infested with *Prosopis juliflora*, a non-native and invasive plant species. The rapid growth of this species is causing significant degradation to the Sanctuary's natural habitat. One of the immediate consequences of this infestation is the reduced availability of fodder for the wildlife, impacting herbivore populations negatively. Without intervention, these weeds are poised to engulf nearly all vital feeding areas of the herbivores, posing a severe threat to their numbers.

To address this issue systematically, there is a proposal to eradicate *Prosopis juliflora* from highly infested zones within the Nahargarh ESZ. This eradication plan will be executed in a phased manner, and the cleared areas will be replanted with trees and grasses of palatable species, ensuring a more suitable habitat for wildlife. As this process will span several years, the plan includes annual weed uprooting for the initial three years.



Moreover, as a gesture of goodwill and to foster a positive relationship with the communities residing on the boundary and inside the sanctuary, the uprooted or cut weeds will be provided, free of cost, to eco-development committees for use as fuelwood or for other purposes. This approach aims to build trust and cooperation among the local people.

In addition to these efforts, other entry point activities and trust-building initiatives will also be undertaken within the Nahargarh ESZ to promote sustainable coexistence between humans and wildlife while safeguarding the ecological integrity of this unique and precious area.

- i) 100 Hectare area every year should be selected for five years and intensive measures should be taken to develop good quality grass and fodder yielding species.
- ii) The area should have potential for providing water, food and shelter round the year.
- iii) Soil, and moisture conservation works should be undertaken to improve the soil and water retention to facilitate better growth of vegetation.
- iv) Small anicuts and check dams should be constructed in the nallas. Treatment should start from the top of the nallas. Drainage Line Treatment works should be taken up.
- v) Contour trenching with sowing of grass seeds should be taken up in the area.
- vi) Construction of small ponds at suitable places should be taken up to ensure water availability for most part of the year.
- vii) Regeneration of *Prosopis juliflora* should be discouraged. Weeding of obnoxious weeds should be taken on regular intervals.
- viii) Surplus Sambar, Chital and other prey base from Jaipur Zoo and other places should be relocated.
- ix) The grazing should be regulated, a system of rotational and deferred grazing should be adopted. Cattle from far flung villages should not be permitted to enter protected areas.
- x) The protection network of the protected areas should be strengthened to counter the menace of illicit felling.
- xi) Cooking gas connections should be released to villages surrounding the protected areas.
- xii) Schemes such as biogas, fuel efficient, *chullahs* etc. should be promoted.



- xiii) The participation of villages should be solicited in improving ecosystem and introducing wild plants of commercial value.
- xiv) Uprooting weeds manually or mechanically and distribution of uprooted material to eco-development committees for utilization as fuel or other purposes.

The thick impenetrable thickets hinder bird's flight and deprive ground nesting birds of nesting sites. The raptors find it difficult to find perching places in areas where there is monoculture of *Prosopis juliflora*. There is also a lack of food for the insectivores since the percentage of invertebrates depends on *Prosopis juliflora* for survival is relatively low.

Long piercing thorns of *Prosopis juliflora* injure animals whose infection made their limbs useless. Blackbucks in Tal Chapper sanctuary were the major victim of its prickly thorns. Its sugary pods attract herbivores. The villagers in Ranthambore National Park, Sawai Madhopur, reported that animals eating the pods from *Prosopis juliflora* have suffered from damage to the dental structures in the past. Leaves are grazed during scarcity, but prolonged use impairs digestive system of the animals.

9.7 Proposals for Ecology and Environment

Nahargarh Eco-Sensitive Zone notification Sub-para 5 of Section 2 has a mention that needs of local community & others aspects of ecology and environment that need attention may be dealt in the Zonal Master Plan. Further to the Section 6 to 16 deals with various types of pollution or pollution causing activities. These are noise pollution, air pollution, discharge of effluents, solid waste, bio-medical waste, plastic waste management, construction and demolition waste management, e-waste, vehicular pollution, vehicular traffic & industrial units.

9.8 Solid Waste Management

- It is necessary to prepare a Solid Waste Management Plan as per state policy and strategy on solid waste management. (As per Section 15 - Solid Waste Management, 2016)
- Solid Waste Management facilities should be provided for the villages which lack solid waste management facilities. Special attention should be given for the villages like Achrol, Khurad, Nestiwas, Sisyawas, Chokhalyawas & Singwana.



- Facility for door-to-door collection of segregated solid waste from all households needs to be provided by the local authority. (As per Section 15 - Solid Waste Management, 2016)
- Frequency of garbage collection should be increased in Achrol village.
- People should be educated and encouraged to segregate waste in their households & to practice home composting, vermi-composting, bio-gas generation, or community level composting.
- All compostable waste should be collected at the village level and remaining solid waste shall be taken for further treatment.
- Review the performance of local bodies, at least once in a quarter on waste segregation, processing, treatment, and disposal by the secretary in charge of village panchayat. (As per Section 15 - Solid Waste Management, 2016)
- Sewerage and Discharge of Effluents
- Decentralized sewerage network such as septic tanks and composting toilets can be constructed in areas like Sisyawas, Nestiwas, Khurad, Singwana, Choklayawas & Baragaon Jarkhya for the treatment of the sewerage in this area.
- Bio-toilets can be constructed as per necessity.
- Public toilets should be constructed near the tourist places. This can be done on the Public Private Partnership model.
- Discharge of treated effluents in Eco-Sensitive Zone shall be in accordance with the provisions of the General Standards for discharge of environment pollutants covered under the Environment Act and the rules made thereunder or standards stipulated by state government whichever is more stringent.

9.9 Mitigation of Air Pollution

- At present there is no significant air pollution in Nahargarh ESZ. Prevention and control of air pollution in the Eco-Sensitive Zone shall be carried out in accordance with the provisions of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules there under if and when necessary, in future.
- Use of E-vehicles should be promoted in Eco-Sensitive Zone. (As per official gazette of Eco-Sensitive Zone of Mount Abu)



9.10 Control of Noise Pollution

- At present there is no significant noise pollution in this area. However, noise pollution needs to be monitored especially in areas near resorts. Prevention and control of noise pollution in the Eco-Sensitive Zone shall be complied with the provisions of the Noise Pollution (Regulations and Control) Rules, 2000 under the Environment Act.
- A loudspeaker or a public address system should not be used/allowed during night. However, in closed premises it may be allowed in spaces such as auditoria, conference rooms, community halls, banquet halls or during a public emergency.
- The noise level at the boundary of the public place, where loudspeaker or a public address system or any other noise source is being used shall not exceed 10dB (A) above the noise standards for the area or 75dB (A) whichever is lower.

9.11 Industrial Areas

No new polluting industries shall be permitted to be set up within the Eco-Sensitive Zone as per Nahargarh ESZ notification.

Only non-polluting industries shall be allowed within the Eco-Sensitive Zone as per the classification of industries in the guidelines issued by the Central Pollution Control Board in February 2016 and as per Nahargarh Zonal Master Plan.

Industries should use green fuels such as CNG and electricity instead of fossil fuels.

Regularly inspections of the industries should be carried out for the industries falling in Eco-Sensitive Zone by Pollution Control Board.

9.12 Mitigation of Construction and Demolition waste management

At present there is no issue of dumping of construction & demolition waste in Nahargarh ESZ area. The construction and demolition waste management in the Eco-Sensitive Zone shall be carried out as per the Construction and Demolition Waste Management Rules, 2016 published by the Government of India in the Ministry of Environment Forest and Climate Change vide notification number G.S.R 317(E), dated the 29th of March, 2016 as amended from time to time.

The construction and demolition waste can be recycled and reused for the construction this will reduce the amount of waste generated in the area.



9.13 Mitigation of Plastic Waste

At present there is no solid waste dumping site or plastic waste processing facility in this area. Recycling, recovery, or disposal of plastic waste shall be carried out as per the rules, regulations, and standards stipulated by the central government from time to time; recycling of plastics shall be carried out following the Indian Standard IS 14534:1998 titled Guidelines for Recycling of Plastics, as amended from time to time; the Municipal Authority shall be responsible for setting up, operationalization and coordination of the waste management system and for performing the associated functions, namely:

- a) To ensure safe collection, storage, segregation, transportation, processing, and disposal of plastic waste.
- b) To ensure that no damage is caused to the environment during this process.
- c) To ensure that open burning of plastic waste is not permitted.
- d) To ban single use plastic such as plastic/ Thermocol (polystyrene) disposable cups, glasses plates (dishes), bowls, forks and spoons, single use PET plastic water bottles in ESZ area. (As per Official Gazette of Eco-Sensitive Zone of Mount Abu)

9.14 Mitigation of Bio-Medical Waste

Bio-Medical Waste disposal facility is available in Jaipur district which is away from this area and hence no action is required in this regard.

9.15 Mitigation of E- Waste

There is no e-waste dumping site or processing facility in Nahargarh ESZ area. The e-waste management in the Eco-Sensitive Zone shall be carried out as per the provisions of the E-Waste Management Rules, 2016, published by the government of India in the Ministry of Environment, Forest and Climate Change as amended from time to time.

10. DEVELOPMENT PROMOTION & CONTROL REGULATIONS AND LANDUSE

10.1 Overview

Development Promotion and Control Regulations (DPCR) are a set of guidelines and rules established by local government authorities to govern landuse and development within a specific jurisdiction. These regulations aim to promote orderly and sustainable development while ensuring that it aligns with the overall planning goals and objectives of the area.

10.2 Landuse as Per Prevailing Master Development Plan/Zonal Development Plan of Jaipur and Allowed Activities in Nahargarh ESZ

As per Nahargarh ESZ Notification, the list of activities is categorized in three parts. All the development decisions shall be in conformity with the activities prohibited, regulated, permitted as per Nahargarh ESZ Notification and also if those activities are not in contravention with prevailing Master Development Plan / Zonal Development Plan of Jaipur.

10.2.1 Prohibited Activities

As per the Nahargarh ESZ Notification the prohibited activities are given in Annexure 10A.

10.2.2 Regulated Activities

As per the Nahargarh ESZ Notification the regulated activities are given in Annexure 10B.

10.2.3 Promoted Activities

As per the Nahargarh ESZ Notification the promoted activities are given in Annexure 10C.

10.3 Provision of Nahargarh ESZ Notification & Prevailing Master Development Plan/Zonal Development Plan of Jaipur

ESZ Notification dated 08-03-2019 prescribes prohibited, promoted and regulated activities. Prevailing Master Development Plan/Zonal Development Plan of Jaipur prescribes Landuse and Development Promotion and Control Regulations for the



whole ESZ Area which shall be taken as basis for permitted and regulated activities within ESZ.

Further, if any activity is prohibited under ESZ Notification dated 08-03-2019 and by any court orders, that prohibition would prevail over the activities allowed as per prevailing Master Development Plan / Zonal Development Plan of Jaipur.

For example, new resorts would not be allowed within Zone 1B of the ESZ, though it is allowed as per prevailing Master Development Plan/Zonal Development Plan of Jaipur.

On the other hand, if any activity is allowed as per ESZ Notification but not as per prevailing Master Development Plan/Zonal Development Plan of Jaipur, then project proponent would need to obtain necessary permission including landuse change, if necessary from the competent authority before undertaking any such project.

For example, new hotels are allowed in Zone 1C as per ESZ Notification dated 08-03-2019 but not as per prevailing Master Development Plan / Zonal Development Plan of Jaipur. Hence, new hotels shall not be allowed in land shown on such lands unless approval for change of landuse is obtained from competent authority.

10.4 Existing Activity/Use

ESZ Notification dated 08-03-2019 prescribed regulations regarding new hotel, resort, commercial establishments, etc. This leads to the requirement of defining what is “existing.”

For purpose of ZMP for the ESZ, hotels, resorts, commercial establishments, etc. shall be considered as existing if they have any of the following issued prior to 08.03.2019 ESZ Notification of Nahargarh:

1. Electricity connection for non-agricultural use.
2. Approval by Tourism Department as tourism unit.
3. Conversion order/Patta for non-agricultural use.
4. Building Plan approval.
5. Order regarding change in landuse.
6. Proof of deposition of tax as hotel, resort, commercial establishment, etc.
7. CTE/CTO/Environmental Clearance.



Additionally, all the duly approved uses existing prior to issue of Nahargarh ESZ Notification shall be honored. Further process will be done in conformity with the development controls & zoning regulation as Per Zonal Master Plan of ESZ.

10.5 Proposed Landuses in Nahargarh ESZ as Per Prevailing Zonal Development Plan of Jaipur

Various landuses have been proposed in prevailing Zonal Development Plan of Jaipur in Nahargarh ESZ area such as residential, commercial, special area, G1, G2 and industrial use, etc. A list showing the extent of proposed landuses is given in Annexure 11, 12 & 13.

As per the interim order in case no. 1554/2004 (Gulab Kothari vs State of Rajasthan and Others.) of Hon'ble Rajasthan High Court, the Recreational, Ecological Use and activities of MDP 2011 is to be retained. Therefore, it is necessary to list the uses permitted in Ecological Zone of MDP 2011 and G1 and G2 use prescribed in MDP 2025. For ready reference, the activities permitted in Ecological Area as per MDP 2011 and the uses permitted as per MDP 2025 are given in Annexure 11, 12 & 13. However, anyone who wishes to propose any project to get approval on his land may obtain prior approval of Monitoring Committee of ESZ and then approval from JDA as per rules.

10.6 Provision of Zoning Regulations of Prevailing Master Development Plan/Zonal Development Plan of Jaipur

The objective of the Development Promotion and Control Regulations (DPCR) for prevailing Master Development Plan/Zonal Development Plan of Jaipur is to promote and regulate development controls for building(s) within use premises in accordance with the development policies and landuse proposals contained in the prevailing Master Development Plan/Zonal Development Plan of Jaipur.

In case of Nahargarh ESZ area all the activities shall be in consonance with Annexures 10A, 10B and 10C.

In case of confusion regarding permissibility of use premises in prevailing Master Development Plan/Zonal Development Plan of Jaipur, the clarification regarding these may be obtained from Jaipur Development Authority from case to case basis.



10.7 Building Parameters for Grant of Approval

The general building parameters for permissions to be granted in Zone 1B and Zone 1C shall be as under:

Maximum Height – 10.5 meters.

However, if the allowed height, as per building byelaws of JDA is less than 10.5 meters. Then, the lesser height would be applicable.

Maximum Ground Coverage – 20%

However, if the plot coverage allowed as per building byelaws of JDA is less than 20% then, the lesser ground coverage would be applicable.

Other building parameters will be as per prevailing Building Byelaws of JDA.

10.8 Development Controls for Hill Areas and Waterbodies

Hilly areas have one of the most fragile ecosystems, which must be conserved. Therefore, planning and development strategies for hilly areas shall be with added sensitivity to check environmental degradation. The development approach shall comprise judicious land use planning and settlement planning. In hill areas of Nahargarh ESZ, no construction will be allowed on lands having slope more than 20-degree inclination, viewing the sensitivity of hilly areas. All environmentally sensitive areas (including earthquake/landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 20-degree, flood plain and areas adjacent to major drainage lines should be declared as no development/construction zone.

It is necessary to leave a buffer zone of 30 meters width along the shores of large water bodies and major drainage channels like Amanishah Nalla (Dravyawati River). Buffer along water bodies, which are not notified under any Act/Statute/Master Plan, is to be kept as per Urban Development Department, Rajasthan's Order dated 20-02-2023. Plantation shall be done in the buffer areas. The preservation of wetlands is a major priority and thus plantation shall be helpful in preservation of bio-diversity also.

10.9 Environmental Clearance from State Environment Impact Assessment Committee or MOEF&CC

As per Sub-para 3 and Sub-para 4 of point no. 6 (Terms of Reference) of Nahargarh Eco-Sensitive Zone Notification, the provision is as under:



The activities that are covered in the Schedule to the notification of the Government of India in the erstwhile Ministry of Environment and Forest number S.O. 1533 (E), dated the 14th September, 2006, and are falling in the Eco-Sensitive Zone, except for the prohibited activities as specified in the table under Paragraph 4 thereof, shall be scrutinised by the monitoring committee based on the actual site-specific conditions and referred to the Central Government in the Ministry of Environment, Forest and Climate Change for prior environmental clearances under the provisions of the said notification.



11. MANAGEMENT AND GOVERNANCE OF ESZ (ACTION PLAN)

The management and governance of Ecologically Sensitive Zones (ESZs) typically involve the development and implementation of Action Plans that aim to protect and conserve the fragile ecosystems, biodiversity, and natural resources within these designated areas.

11.1 Monitoring Committee for Monitoring the Eco-Sensitive Zone

For effective monitoring of the provisions of this notification under Sub-Section (3) of Section 3 of the Environment (Protection) Act, 1986, the Central Government hereby constitutes a Monitoring Committee, comprising of the following, namely:

Table: 11.1 Monitoring Committee

S. No.	Constituent of the Monitoring Committee	Designation
1	District Collector, Jaipur	Chairman, ex officio;
2	Sub Divisional Officer, Amer	Member;
3	A representative of a non-governmental organisation or working in the field of wildlife conservation to be nominated by the Government of Rajasthan for three years	Member;
4	One expert in Ecology and Environment from a reputed institution or the university of the State is to be nominated by the Government of Rajasthan for three years.	Member;
5	Honorary wildlife warden, Jaipur	Member;
6	Regional Officer, Rajasthan State Pollution Control Board	Member;
7	Mayor, Jaipur Municipal Corporation	Member;
8	Pradhan, Panchayat Samiti, Amer	Member;
9	Member of the State Biodiversity Board	Member;
10	Deputy Conservator of Forest/Wildlife, Jaipur	Member-Secretary.

11.2 Management Structure of Nahargarh Wildlife & Forest

To understand the management and governance aspects of Nahargarh Forest & Wildlife is needed to present the organizational structure. As per the DCF Wildlife (Zoo), this covers three jurisdictions i.e. Nahargarh Biological Park (NBP), Nahargarh Wildlife Sanctuary and Jaipur Territorial. Apart from it, there is Assistant Conservator of Forest (ACF) headed by DCF.



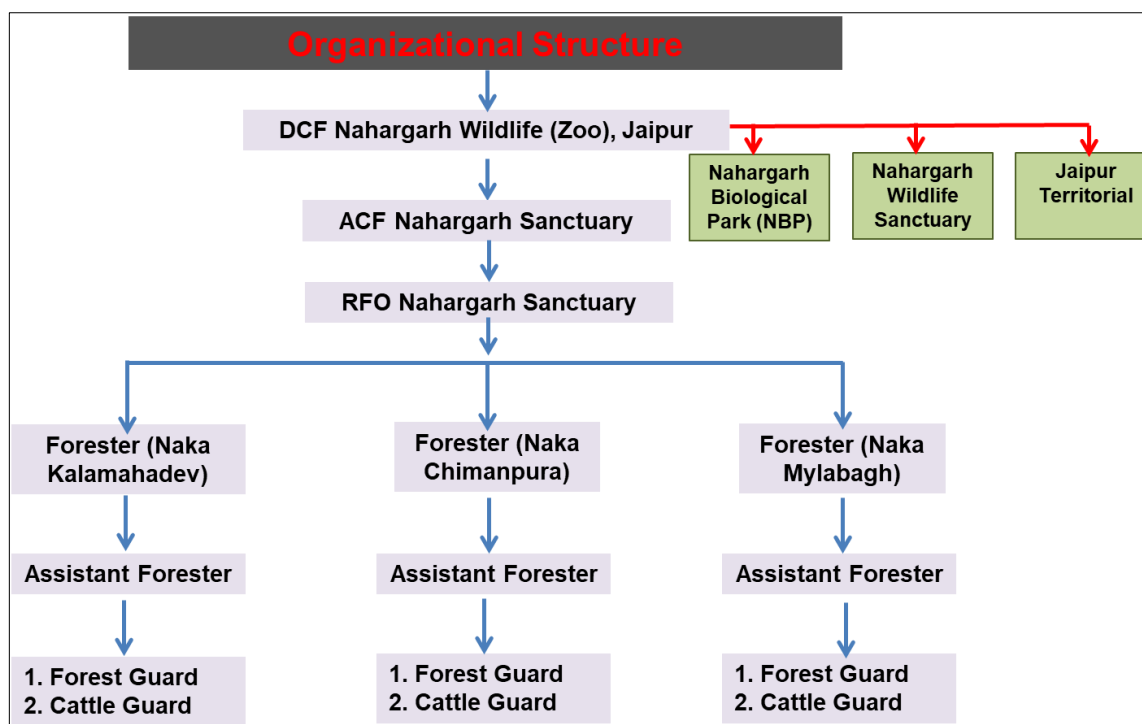


Figure No.: 11.1 Organizational Structure of Nahargarh ESZ

Source: DCF (Wildlife) Zoo, Jaipur (2022).

11.3 Control of Grazing in Nahargarh ESZ

At present, there is no control over grazing in Nahargarh Wildlife Sanctuary. The area is extensively used by grazers. Cattle from villages in and around the protected areas are dependent on its fodder. There is a need to control grazing by following means:

- i) Selected areas should be closed for grazing and suitable intervention to develop grasses and promote the growth of natural rootstock should be taken up.
- ii) Encroachments in the village pastures and revenue lands should be removed and these areas should be developed into village pastures.
- iii) A system of rotational and deferred grazing should be evolved in consultation with the villagers.
- iv) Village Grazing Plans for villages existing in the Sanctuary and near the Sanctuary should be prepared to identify rights and concessions available to various villages.
- v) Rearing goats and sheep should be discouraged.
- vi) Some areas of the Sanctuary should be kept as the core area where grazing should be banned.



- vii) Water bodies near villages should be created so that cattle do not go deep into the forest.
- viii) Extensive soil and water conservation work should be taken up to improve ground flora.
- ix) Honorary WL Guards should be appointed in the village situated in the vicinity of the Sanctuary.
- x) Alternate income-generating activities should be promoted in the villages by promoting eco-tourism.
- xi) Unproductive cattle should be reduced by sterilizing the scrub animals and improved breed should be introduced through artificial insemination.
- xii) Village-level institutions that are the real stakeholders should be strengthened by providing regular visits of Social Development Officers.
- xiii) As it would not be practical to regulate grazing during the rainy season, grazing fees should be levied in the Sanctuary Area to make grazing less lucrative.
- xiv) Grazing fees should be collected, and the villagers to be issued permits so that unauthorized entries can be restricted. The fee can be as per the below animals annually:
 - a) Buffaloes - Rs. 500.00 per animal/year
 - b) Sheep/goat - RS. 300.00 per animal/year
 - c) Cow - Rs. 500.00 per animal/year
 - d) Camel - Rs. 1500.00 per animal/year

11.4 Control of Poaching Activities

- i) **Rehabilitation of Bawariyas, Tribal Communities, and other Nomadic Hunters-**
The rehabilitation process has to be planned with careful thought about the needs of these people, their culture, education and the new skills that they will need to survive. The Bawariyas should be treated as landless people and should be rehabilitated as per the approved package of rehabilitation of villagers from protected areas to outside.
- ii) **Improving Staffing Pattern-** The effective protection of the protected areas depends on the strength of quality staff. There has been no fresh recruitment of the staff at Forest Guards and Forester Level for the last 25 years. This is the cutting edge of the department. These two grades form the frontline force, which should always



be young, enthusiastic, educated and trained to deal with forest and wildlife offences. Moreover, women staff should also be inducted into the lower cadre to deal with woman offenders.

- iii) **Mobility and Firearms-** Today criminals are well equipped with vehicles, sophisticated weapons, mobile phones etc. whereas sanctuary staff is not in a position to compete with the offenders with the existing mobility and equipment. It is the need of the hour to provide jeeps to Sanctuary In-Charge Officers and motorcycles to all Forest Rangers for effective patrolling. Firearms should also be provided to all officers from DCF to Forest Guard. Every Naka should have at least two double barrel guns. The staff should be trained in handling these weapons for anti-poaching activities.
- iv) **Secret Information System-** The poachers generally have serious criminal behaviour. The traditional hunting communities and nomadic tribes have a vast network throughout the country through marriage alliances. The following steps are required to prevent wildlife crimes done by traditional hunting communities, and tribes:
 - a) Forest staff should be vigilant about the movement of the nomadic tribes.
 - b) Camps of these tribes should be searched regularly, and they should not be allowed to camp in the vicinity of the ESZ.
 - c) Checkpoints should be established at the sensitive points of the Sanctuary and ESZ.
 - d) The patrolling methodology should be suitably modified so that the movement and secrecy of the Field Staff match with the poacher.
 - e) The prevention, detection and prosecution of forest and wildlife offences are very dismal. Record keeping and disposal of the cases are very poor. Well-educated and trained foresters capable of handling offence cases should be posted. Regular monitoring of such cases is necessary.
 - f) Traditional hunting communities and nomadic tribes residing in the vicinity of the sanctuary area should be surveyed and listed.
- v) **Field Level Improvement-** Wildlife protection requires substantial improvement at the field level that can be achieved by adopting the following measures:
 - a. There should be round-the-clock readiness of the Flying Squad and the officers to nab the offenders, for this, there must be a separate staff and vehicle with two drivers.



- b. The maintenance of village crime reports for each village inside the ESZ should be made mandatory at the *naka* level and should be reviewed regularly by higher offices.
 - c. A secret information system should be developed effectively for this Range Officers should be empowered to operate secret information fund. The fund limit may be kept as below.
 - d. There are many counter-cases and offence cases filed against the staff. All such cases must be treated as government cases instead of private cases.
 - e. At range level, 5 to 6 Guards should be kept as a reserve for emergency calls so that any information related to poaching or any Forest offence can be checked.
 - f. Professional training to deal with WL offences and handling should be imparted regularly.
 - g. The Front-Line Staff is old aged and untrained. The motivational level is very low. Recruitment of young and energetic staff is the need of the hour.
 - h. Award schemes and percentage of compensation realized in offence cases should be given to staff to motivate them.
 - i. Forest officers should be empowered with police powers under the arms act within a 10 km radius from the periphery of the Sanctuary.
- vi) **Check Points for Illicit Movement of Forest and Wildlife Products-** The best way to check illegal transit of forest and wildlife products is to strengthen the present checkpoints and set up new checkpoints and barriers. The new barriers, chowkies and *nakas* which are proposed to be set up on priority, are at:

Table: 11.2 Proposed Barriers, Chowkis and Nakas in Nahargarh ESZ

S.No.	Proposed Barriers	Proposed Chowkis	Proposed Naka's
1.	Nahargarh	Kishanbagh	Daulatpura-Kotda
2.	Akera	Nahargarh	
3.	-	Kunda	

Source: DCF (Wildlife) Zoo, Jaipur (2022).

There are a few important following points which are chief concerns to be kept in mind are:

- a) Each barrier point should be manned at least by a staff of 2-forest guards + 3 cattle guards.
- b) Each barrier point should be equipped with a wireless system.
- c) The register should be maintained about the movements and checking done by the team.



11.5 Control of Felling Trees

As said earlier, the maximum consumption of wood occurs during winters. Nearby villages are heavily dependent on the forest for firewood. Because of this severe pressure on the forest, falling in the vicinity of Jaipur city has become prone to illegal felling. Availability of firewood is low in the area and the people are resorting to pollarding and cutting off live green trees. The following recommendations are mentioned here:

- i) Gas connections should be given at concessional rates to nearby villagers so that pressure on the ESZ for firewood could be reduced. This type of method has proved successful in Ranthambhore National Park.
- ii) These gas connections have given a tremendous impact on fuel wood consumption.
- iii) Energy plantation initiatives should be extended to encompass the areas surrounding the sanctuary and within its Eco-Sensitive Zone (ESZ). The area should be closed for a period of 3 to 4 years. Fast-growing and indigenous species like Ardu, Churel, Albizzia, Desi Babool and hardy species like Neem, Pongamia, and Shishum should be planted.
- iv) It is strongly suggested that Prosopis Juli flora and Eucalyptus should not be planted at all.
- v) The area should be covered in regular patches of 20-25 hectares each. A series of such woodlots should be developed for a village. The villagers should be encouraged to take up these energy plantations for regeneration through Joint Forest Management.
- vi) Implementing an extensive tree planting program in the villages adjacent to the Sanctuary and within its Eco-Sensitive Zone (ESZ) is imperative. This initiative should primarily target marginal lands and agricultural bunds to maximize its ecological impact.
- vii) Schemes such as biogas, fuel-efficient crematoria, solar light, solar cookers, fuel-efficient *chulhas* etc. should be promoted with the active participation of Sanctuary Area Staff.



11.6 Soil Conservation, Water Harvesting, and Combating with Drought Conditions

The Nahargarh Eco-Sensitive Zone (ESZ) is characterized by a hilly and undulating terrain with very shallow soil. Beneath this shallow soil layer lies a stony substrate, resulting in sparse vegetation growth. This challenging landscape, combined with soil erosion, poses significant ecological challenges for the Nahargarh ESZ.

One of the critical issues faced is the conservation of soil and water resources. Due to the presence of nallahs (seasonal streams), it's imperative to implement soil and water conservation measures. These measures may include the construction of check dams, earthen dams, gabion structures, and anicuts at various points along these streams to control soil erosion and retain water.

Water availability in the Nahargarh ESZ area is a pressing concern. Situated in a dry tropical zone, the region receives relatively low rainfall, approximately 600 mm annually, with only two rainy months. Harsh summers lead to rapid evaporation of the limited rainwater collected in low-lying areas. Additionally, the geomorphological features of the area result in minimal water retention in the subsoil. Frequent droughts exacerbate the water shortage issue.

Water scarcity forces wildlife out of the Sanctuary in search of water, making them vulnerable to accidents or poaching by local villagers. To address these challenges, several strategies have been proposed:

- i) Ensuring one water hole for every 5 sq.km. area throughout the year, strategically placed to meet the water requirements of different habitats and ensure even dispersal of animals.
- ii) Regular desilting of existing water holes to maintain their water-holding capacity.
- iii) Proposing new water holes to augment water availability.
- iv) In drought years, filling water holes regularly using pumps or water transportation.
- v) Installing hand pumps near existing chowkis to provide water for staff and wildlife.
- vi) Periodically deepening and maintaining old wells to ensure sufficient water during dry periods.



vii) Constructing shallow wells with ramps near nallahs to provide accessible water for wildlife, requiring less maintenance.

viii) Implementing drainage line treatment to conserve moisture in the area.

ix) Carrying out soil and water conservation measures on a watershed basis, recognizing watersheds as natural hydrological entities.

x) Undertaking integrated area development plans to combat land degradation, soil and water losses, and improve the environment.

Specific areas within the Nahargarh ESZ where these conservation activities are proposed include:

- Lambi ka Nallah
- Cheen ka Nallah
- Jidolia Nallah
- Khurd ka Nallah

The preservation of the fragile ecosystem in and around the Nahargarh ESZ necessitates these soil and water conservation efforts, especially considering the high levels of degradation due to soil loss and moisture depletion exacerbated by grazing pressures. These measures aim to maintain ecological balance and sustain the area's unique biodiversity.

11.7 Infrastructure and Communication

i) The infrastructure (buildings) for accommodating the staff at present is inadequate. The new buildings are being proposed during the Plan Period.

ii) The communication is presently facilitated by wireless network system. The existing wireless network system is insufficient to fulfill the needs of the Sanctuary and ESZ area. Wireless sets are proposed at every *chowki* and *naka* along with trained wireless operating staff.

Table: 11.3 List of Proposed Wireless Sets for Nahargarh ESZ

S. No.	Range Nahargarh	Range Amer
1.	Daulatpura	Chimanpura
2.	Maylabag	Kukas
3.	Akera	Sisyawas

Source: DCF (Wildlife) Zoo, Jaipur (2022).



11.8 Training of Forest and Wildlife Staff

Basic skill development for field staff is of paramount importance. It is being felt that there is inadequacy of training at all levels. Most of the staff of sanctuary is not trained in the matter of wildlife protection, conservation and other related subjects of wildlife management. Specialized training of the staff is essential to tone up their skills from time to time. It is proposed to carry out regular training programs in the field as well as at reputed specialized institutes of the country. The training course can be of short or long duration depending upon the course contents. Likely areas of training can be as follows:

- i) Field botany
- ii) Avi- fauna
- iii) Population dynamics
- iv) Major ungulate population variations
- v) Regeneration of various species
- vi) Wildlife laws
- vii) Forestry laws
- viii) Nature interpretation and eco-tourism
- ix) Animal health and nutrition
- x) Advanced techniques of wildlife management
- xi) Techniques of carrying out wildlife estimations/census
- xii) Techniques of eco-development

These are some of the aspects on which the training must be organized. Short term training courses should be held at the field level also to impart basic skills to the field staff. Detailed year wise training plan will be prepared in consultation with the training institutes. The institutes where these trainings can to be organized from the institutes i.e. Wildlife Institute of India, (Dehradun), Forestry Training Institute, (Jaipur), Indian Institute of Forestry Management, (Bhopal), Indira Gandhi National Forest Academy, (Dehradun) and Central Arid Zone Research Institute (CAZRI), (Jodhpur).

11.9 Eco-Development Strategies

As discussed earlier, Nahargarh Sanctuary is fortunate to have richness of natural beauty, flora and fauna accompanied with places of religious historical and archeological importance. Following points are listed in strategy of eco-development and eco-tourism in Nahargarh ESZ:



- i) Pasture development for reducing the grazing pressures inside the protected areas
- ii) Village fuel wood lots should be developed to reduce pressure on the protected areas
- iii) Investment in developing water holes inside the protected areas
- iv) Coordination with other rural development schemes
- v) Development promotions and land use regulations should be as per the zoning regulation for the eco-development and eco-tourism activities (see Chapter 9).

11.10 Disaster Management Policy

11.10.1 Control of Fire Incidents

As it said earlier, no major fires and damage has been reported in the last five years in the ESZ. Although, during the field visit, it was found there was few fire incidents at local level which were mainly due to human beings. These incidents can be converted into gigantic forest fire events anytime. There is such a potential of such fires which can be highly experienced during summer months, from April to June, which is the hottest period. Moreover, some fires may be there during winter months also, particularly when drought is prolonged. Nevertheless, the fire problem is somewhat a controlled feature. To prevent major fires and damage a well-coordinated and integrated fire management system is pre-requisite. To control the fire, following strategies are given here:

- i) Prevention of man-caused fires through education and environmental modification
- ii) Prompt detection of fires through well-conceived network of observation points, efficient ground patrolling, communication system etc.
- iii) Fast initial counter measure
- iv) Vigorous follow-up action
- v) Fire lines should be maintained regularly and new fire lines should be constructed to ensure there is no loss of flora and fauna.
- vi) The existing fire lines should be cleaned regularly before summer season.
- vii) The firewatchers should be appointed during summer season, for effective ground patrolling.
- viii) The field staff should be given proper training in firefighting.
- ix) Fire watch towers should be constructed to keep watch on fire prone areas.



- x) It is proposed to construct 2 fire watch towers in the Sanctuary area, at an estimated cost of Rs.3.00 lakhs per watch tower, at Nahargarh Fort and Sisyawas on priority basis.
- xi) People are either ignorant or not aware or mis-informed of the danger and damage of fire in the forest area, therefore, the awareness, and literacy of people should be enhanced. Information brochures, handbills should be published and distributed.
- xii) Tourists should be discouraged to carry bidi/cigarettes. Smoking should be banned totally, by which we can prevent accidental fires.
- xiii) Use of organized community co-operators in fire prevention work. Selected villagers in the proximal villages should be identified, and they should be given training for firefighting. A co-operative fire prevention and suppression programme should be developed.
- xiv) At each naka level, adequate number of buckets axes to cut trees, fire extinguishers (one or two); spades should be maintained to combat fire.
- xv) A rough forests fire map has been prepared indicating fire prone area, existing fire line and proposed fire lines. Detailed maps should be meticulously drawn up for the ranges.
- xvi) New fire lines are to be identified, and cut as per the sensitivity of the area to fire hazard.
- xvii) The field staff should be given proper training in firefighting.

Each of the above components plays an important role in the success of the entire system of fire management. Laxity towards or neglect of any of these components would lead to inevitable failure of the system.

11.10.2 Encroachment

As said earlier, being close to the Jaipur city, encroachment is a major problem in and around Nahargarh ESZ. Nahargarh, Kishanbagh, Kunda, Kukas, Kundlav, Devikhol and Kalamahadev are the encroachment prone areas. The encroachment in the areas is primarily for houses. The following strategies are mentioned to tackle the encroachments:

- i) Patrolling of the boundaries of the ESZ should be done regularly to check if there is any breach of the boundary line.



- ii) Officials such as DCF, ACF, and RFOs should personally inspect boundary pillars from time to time as per the norms and the report thus obtained should be monitored in the review meeting.
- iii) All the broken or removed pillars are to be replaced immediately.
- iv) The non-mutated land should be taken up on priority basis for mutation. This matter should be taken up at higher level.
- v) Land records, and block details should be maintained at range and naka level.
- vi) Encroachment cases must be given priority.
- vii) Construction of pucca boundary wall in encroachment infested areas should be taken on priority so that further encroachments can be controlled.
- viii) Pressure should be created on state government to shift the kachi- basties (slums) habited on forestland.
- ix) Such departments i.e. RSVNL, PHED and DSO Should be instructed through a government policy to not issuing power and water connections and ration cards to encroachers.
- x) JDA and Nagar Nigam should be instructed not to conduct any survey for regularization of encroachments on forestland.
- xi) Beat maps of the area should be prepared showing clear boundaries, and other important features. The beat guard should have these beat maps all the time so that he can inspect the boundaries falling in his area of control.
- xii) Name of block, compartment number and number of pillar should be inscribed on the pillars and record maintained in the office.
- xiii) The entire forest land records should be entered in the computer.



PART-C TOURISM MASTER PLAN FOR NAHARGARH ECO- SENSITIVE ZONE



12. HERITAGE AND TOURISM PROFILE OF ESZ

Heritage and tourism are interlinked and dependent on each other. Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for entertainment, refreshment, recreational or business/professional and religious purposes.

12.1 Existing Tourism Profile of Rajasthan

Rajasthan is the largest state in India, and it is famous for rich cultural diversity because of its variable climate from moist subtropical in the South - East to semi-arid and arid conditions in the North - West state is also unique in biological diversity, which attracts not only domestic as well as an international tourist as well. The status of tourist footfall can be depicted in the Table 12.1.

Table: 12.1 Tourist Footfall

S. No.	Year	Domestic Tourist	Foreign Tourist	Total Tourist
1.	2015-16	4511029	690345	5201374
2.	2016-17	4280481	804152	5084633
3.	2017-18	4582999	870137	5453136
4.	2018-19	5353291	930029	6283320
5.	2019-20	5227045	792799	6019844

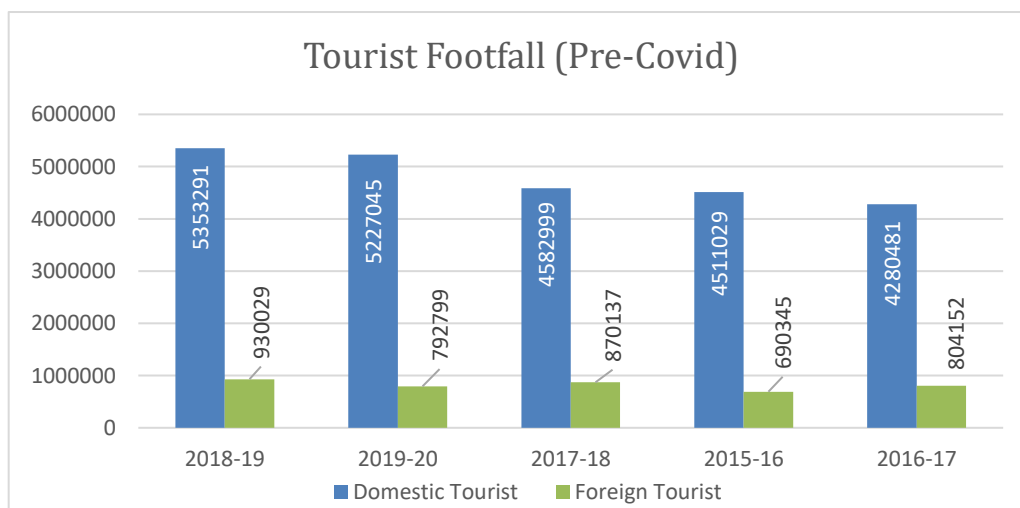


Figure No.: 12.1 Graph: Tourist Footfall (Pre-Covid)

Source: Rajasthan Tourism Development Corporation Ltd.

According to the report by RTDC, the above chart shows the tourist footfall, 5 years before Covid-19. The maximum number of tourists who visited Rajasthan was in the year 2018-2019, i.e. approximately 62.83 lakh tourists. According to the report, it is

also analyzed that out of the total tourists who visited the state in the previous 5 years of the pre-Covid period, 15% of the tourists are international.

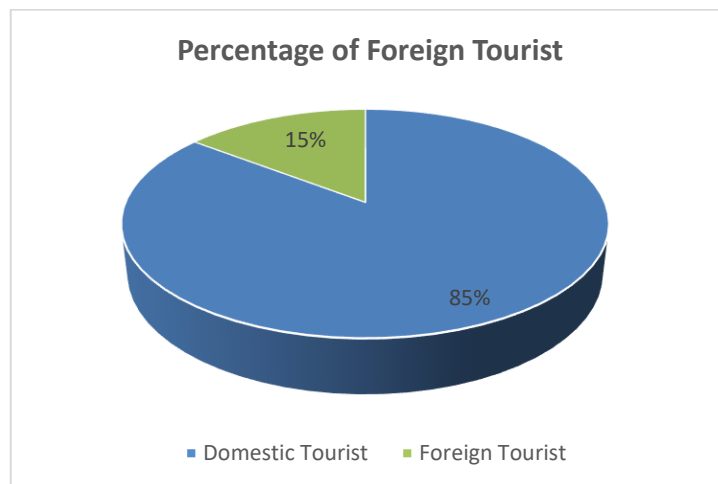


Figure No.: 12.2 Pie Chart: Percentage of Foreign Tourist

The post-covid tourist footfall has been worked out separately because, the movement of tourists was restricted in the whole country, which was later opened with specific covid measures and precautions. As per the report in the year 2020-2021, only 1941600 tourists visited Rajasthan, of which only 2131 were international tourists. Whereas the tourist footfall tends to increase in the current year as the restriction have been removed.

Table: 12.2 Tourist Footfall – post Covid

S. No.	Year	Domestic Tourist	Foreign Tourist	Total Tourist
1.	2020-21	1939469	2131	1941600
2.	2021-22	4171642	15691	4187333

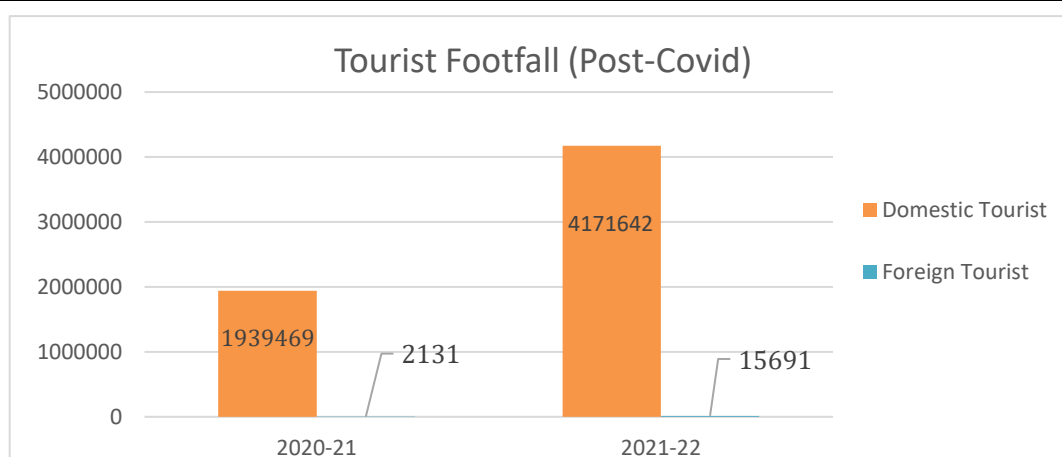


Figure No.: 12.3 Graph: Tourist Footfall (Post-Covid)

12.2 Tourism

12.2.1 Project Study

Studies have been carried out to identify the existing tourist place, and prominent tourist locations and various surveys related to parking issues, traffic and transportation. Thereafter, data analysis of the collected data has been conducted such as tourism resource analysis, tourism infrastructure analysis, tourism trends analysis & stakeholder surveys to arrive at tourism development strategy, formulation of tourism circuits, and demand estimation.

12.2.2 Important Tourist Sites of Eco-Sensitive Zone

As per the site visits and existing site analysis of all the sites, issues are identified for individual sites and accordingly the recommendation for improvement of the tourist facilities are suggested below:

The following sites are falling in Eco-Sensitive Zone but outside Nahargarh Wildlife Sanctuary. These sites are:

1. Achrol Fort
2. Jal Mahal
3. Hathigaon
4. Chamunda Temple Achrol
5. Kanak Vrindavan
6. Old Govind Dev Ji Temple

12.2.2.1 Achrol Fort

Achrol Fort, perched atop the Aravalli hills, stands as a testament to Rajasthan's rich history and architectural heritage. This centuries-old fort had been relatively lesser-known compared to some of Jaipur's more famous landmarks, making it an intriguing destination for history enthusiasts and explorers seeking a quieter, more authentic experience.

The fort's strategic hilltop location provided breathtaking panoramic views of the surrounding landscape, including the picturesque Aravalli hills. Visitors to Achrol Fort could enjoy not only its historical significance but also the serene natural beauty of the region.

Efforts to promote Achrol Fort as a historical and eco-tourism destination had been underway. While it had not reached the level of popularity of some other Jaipur forts, the



site had begun to attract attention from travelers looking for a more off-the-beaten-path experience. The site is equally meaningful for domestic and international tourists, and approximately 15000-20000 tourists monthly visit this palace, whereas 100,000 monthly during peak season. The staying duration of the visitors ranges between 1-2 hours.

Below are some issues as per the existing situation analysis:

- There is no reception centre available.
- The site is lacking behind a cloakroom.



Figure No.: 12.4 Existing site map of Achrol Fort



Figure No.: 12.5 Existing site images of Achrol Fort

12.2.2.2 Jal Mahal

Jal Mahal (meaning "Water Palace") is a palace in the middle of the Man Sagar Lake in Jaipur city, the capital of the state of Rajasthan, India. The palace was originally constructed in 1699; the building and the lake around it were later renovated and enlarged in the 18th century by Maharaja Jai Singh II of Amber. Jal Mahal's unique location, surrounded by the serene waters of Man Sagar Lake and the picturesque Aravalli hills, had made it an ideal spot for eco-tourism. Visitors could not only explore the historical palace but also immerse themselves in the natural beauty of the site. Boat rides on the lake offered a low-impact way to approach the palace, allowing tourists to appreciate both its architectural grandeur and the surrounding environment.

Conservation efforts had been put in place to improve the water quality of Man Sagar Lake and protect the local ecology. These initiatives aimed to maintain a delicate balance between preserving the environment and promoting tourism. Additionally, the lake had become a habitat for various bird species, attracting birdwatchers and nature enthusiasts.

The palace had suffered subsidence in the past and also partial seepage (plasterwork and wall damage equivalent to rising damp) because of water logging, which has been repaired under a restoration project of the Government of Rajasthan. The site is equally meaningful for domestic and international tourists, and approximately 15000-20000 tourists monthly visit this palace, whereas monthly 100,000 tourists visit during

peak season. The staying duration of the visitors ranges between 1-2 hours. Below are some issues as per the existing situation analysis:

- A drinking water facility is missing in the areas outside of the Jal Mahal along with the road stretch.
- The site is lacking a cloakroom.
- The lake front development lacks proper parking facilities.



EXISTING SITE MAP OF JAL MAHAL



Figure No.: 12.6 Existing site map of Jal Mahal



Existing Situation of Pond



Garbage Collection



Informal Shops



Existing Structure

Figure No.: 12.7 Tourist spots near to the Jal Mahal

12.2.2.3 Hathigaon

Hathigaon, or Elephant Village, had established itself as an extraordinary historical site that beautifully blended cultural heritage with a commitment to elephant welfare. This location had gained prominence for its dual role as a sanctuary for rescued elephants and a cultural center dedicated to celebrating the rich tradition of elephant use in Indian society.

The village was home to a group of rescued elephants, providing them with a peaceful and natural environment. These elephants, often retired from various roles, including labour and ceremonies, found a safe haven in Hathigaon. The site prioritized their well-being and aimed to offer them a more humane and dignified life in their later years.

Visitors to Hathigaon had the opportunity to engage in immersive experiences that allowed them to learn about the cultural significance of elephants in India. Guided tours and educational programs introduced tourists to the historical roles that elephants have played in religious ceremonies, processions, and daily life throughout Indian history.

Hathigaon is a housing project for Mahouts (caretakers) and their elephants, Hathigaon (or elephant village) is situated at the foothill of the Amber Palace and Fort. Hathigaon is a recreational wildlife-based tourist site famous for elephant rides. The site is a natural location for the habitat of elephants. Approximately 1000-2000 tourists of domestic and international category monthly visit here. The number of tourists in the peak season touches nearly 50000, monthly, during peak season. The staying duration of the visitors generally ranges between 2-3 hours.



LOCATION OF HATHI GAON AND ITS SURROUNDINGS



Figure No.: 12.8 Location of Hathigaon

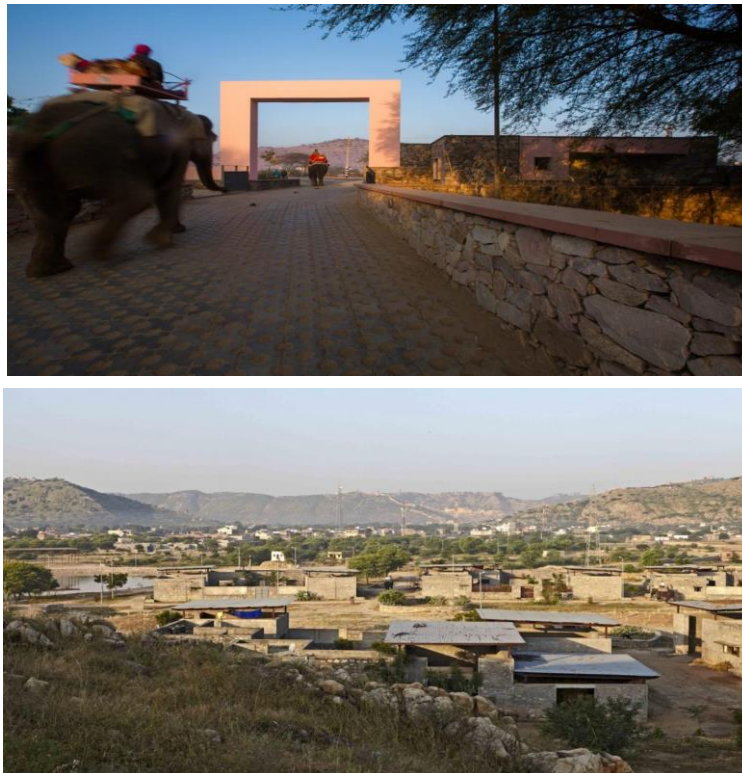


Figure No.: 12.9 (Top) Entrance of the Hathigaon park, (Bottom) Shelters for elephants

12.2.2.4 Chamunda Temple Achrol

Chamunda Devi Temple, dedicated to the goddess Chamunda, is a revered religious site located in the picturesque surroundings of Achrol in the Aravalli hills near Jaipur. The temple holds immense significance for devotees and pilgrims who visit to seek blessings, offer prayers, and partake in religious rituals.

The temple's architecture and design showcase a blend of traditional Rajasthani and Mughal styles, reflecting the rich cultural heritage of the region. The temple complex typically includes a main shrine dedicated to Chamunda Devi, surrounded by smaller shrines and courtyards that add to the spiritual ambiance. Throughout the year, Chamunda Devi Temple attracts devotees and tourists alike, creating a vibrant atmosphere of faith and devotion. Visitors often participate in religious ceremonies, make offerings, and engage in rituals that are an integral part of Hindu worship.

In recent years, efforts to promote religious and eco-tourism around Chamunda Devi Temple have been on the rise. Pilgrims and tourists are not only drawn to the temple for its religious significance but also for the serene natural beauty of the surrounding Aravalli hills. The temple area, along with the nearby hills and forests, has

been explored for eco-tourism activities. Nature enthusiasts and trekkers have the opportunity to explore the region, appreciate its biodiversity, and enjoy hiking trails that provide stunning views of the landscape. Below are some issues as per the existing situation analysis:

- No protection on the boundary wall of the temple on hill top.
- Access road is smaller and can be accessed only on foot.
- A drinking water facility is missing in the area.

EXISTIGN SITE MAP OF CHAMUNDA TEMPLE



Figure No.: 12.10 Site of Chamunda Temple

12.2.2.5 Kanak Vrindavan

Kanak Vrindavan is a garden in Jaipur, the capital of Rajasthan. It is built in a valley surrounded by Aravalli Hills and is located on the way to the Amer Fort at the bottom of the Nahargarh Hill. The place is approx. 8 km North of Jaipur city. The garden complex is having many nearby tourist attractions as the Amer Fort Palace, Jaigarh

Fort and Nahargarh Fort along with much lush greenery. The garden was coined by Kachchwaha Rajput Maharaja Sawai Jai Singh of Jaipur, approximately 275 years ago, at the time when the complex was built. It includes term 'Vrindavan' as the garden resembles the descriptions of the place, where God Sri Krishna had performed 'Maha Raas' near Mathura, and word 'Kanak' came from *maharaja's* one of the *maharani*, Kanakde. This garden is compared to the valley of Vrindavan and the *maharaja*, consecrated an idol of Sri Krishna in a temple in the Kanak Vrindavan valley called the Shri Govind Deoji Parisar. The garden has a temple, a series of fountains and intricate marble decorations. It is managed by the Government of Rajasthan.



Figure No.: 12.11 Existing site map of Kanak Vrindavan



Figure No.: 12.12 Image of the existing structure of Kanak Vrindavan

12.2.2.6 Govind Ji Temple

The Govind Dev Ji Temple has been a prominent religious and cultural landmark in Jaipur for centuries. This temple is devoted to Lord Krishna and is a vital part of the city's spiritual and cultural fabric. Devotees, both local and from distant places, visit this temple to offer their prayers, seek blessings, and experience the divine presence of Lord Krishna.

The temple's architecture is a fine example of Rajasthani craftsmanship and architectural style. Its distinct pink sandstone structure and intricate designs make it a visual delight. The temple complex typically includes the main sanctum dedicated to Lord Krishna, along with various smaller shrines, courtyards, and pavilions, all adding to its grandeur. Religious ceremonies and rituals are conducted daily at the Govind Dev Ji Temple, following age-old traditions. The atmosphere is filled with devotion, with the melodious chanting of hymns and the mesmerizing sound of bells. The temple is especially renowned for its 'Aarti' ceremony, which takes place multiple times a day and is a highlight for visitors.

The site is equally important for tourists of domestic & international categories and approximately 15000-20,000 tourists monthly visit this site whereas 100,000 tourists monthly visit during peak season. The staying duration of the tourists is generally around 1-2 hours. Below are some issues as per the existing situation analysis:

- There is no cloak room at the site.
- There is congestion in parking area in peak season.

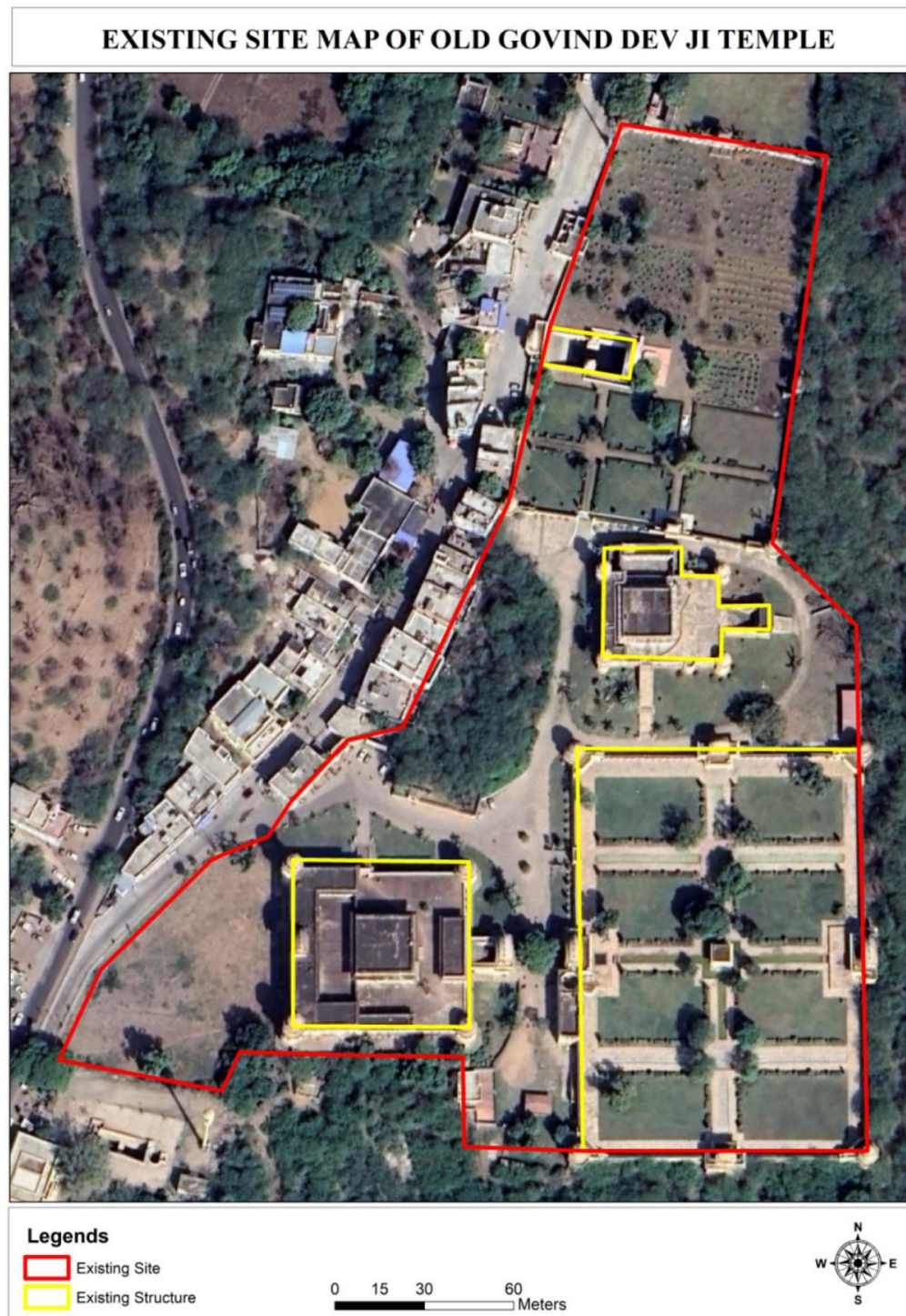


Figure No.: 12.13 Existing site map of Old gobinda ji Temple



Figure No.: 12.14 Images of the existing structures at Old Govind Ji Temple

12.2.3 Infrastructure Facilities (Site Level)

The existing situation of the facilities and infrastructure were assessed by conducting surveys and site visits. Basis infrastructure facilities that should be available at any tourist site are drinking water, public toilet, tourist information centre, and cafeteria, sitting arrangement, medical facility, sanitation facility, public lights, and rain shelters. The assessment of existing facilities can be depicted below:

Table: 12.3 Infrastructure Facilities at Tourist Sites

Status of facilities and Infrastructure at Tourist Site in ESZ Area												
Sl. No	Sites	Approach Road	Drinking water	Public Toilet	Street Light	Sitting arrangement	SWM	Security	Medical facility	Info. Tourist Centre	Parking	Shops/ Cafes'
1	Jal Mahal	Yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
2	Achrol Fort	No	No	No	No	No	No	No	No	No	No	No
3	Hathi Gaon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
4	Old Govind Dev Ji temple	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
5	Chamunda Temple Achrol	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No

12.2.4 Situational Analysis

Accessibility and ease of traveling plays very important role. Roadways remains the principal mode of intra-region travel. At present the important tourist places like Amer, Nahargarh, and Jaigarh are very well connected through road networks. But in the current scenario, the infrastructure alongside the road is not appropriate, and also connectivity with existing modes of transport is still a major challenge. Analysis has been done on key gaps in the transportation sector from tourism perspective which affects tourist footfall. Many religious and heritage sites are left undeveloped and also lack with appropriate connectivity, these sites have been identified, to prepare the proposals for development.

12.2.5 Tourism Resources

The region is very rich with natural resources & biodiversity. The region is blessed with:

- I. Rich heritage and cultural & local traditions.
- II. Forest wealth (rich flora and fauna).
- III. Diverse tourist attractions having its own distinct features.

These attractions are spread over the entire region and are largely located in remote areas within highly fragile environments.



12.2.6 Tourism Trends

The tourism trends have been analyzed to understand the existing tourism profile, potential tourism scenario, and the trend projections of the ESZ, Nahargarh. In addition to primary surveys across all the areas under ESZ, stakeholder discussions formed a major part of the trend analysis and the approach to tourism strategy and products development. Also, the previous year tourist footfall has been collected from the Department of Tourism, Rajasthan. According to the report in Financial Year-2021 total 1006731 tourists have visited the Jaipur in which 992014 are domestic tourists whereas rest 14717 are the tourists from other countries.

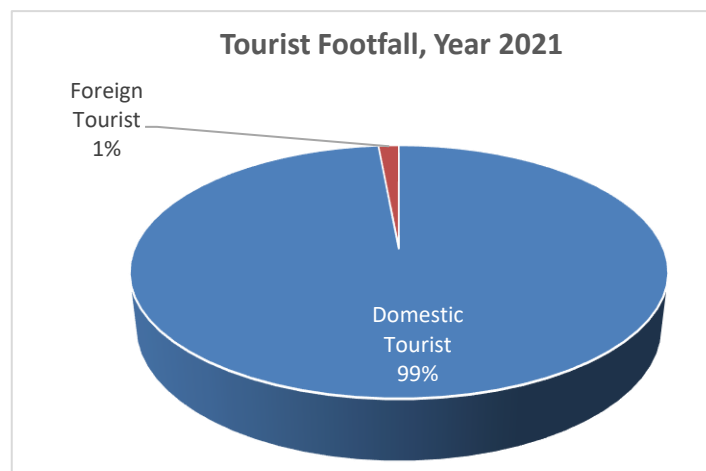


Figure No.: 12.15 Tourist Footfall- 2021

The tourism development issues are identified and categorized under:

- Resource related issues
- Development issues:
 1. Accessibility
 2. Tourist amenities & infrastructure
 3. Destination/ Circuit development
 4. Information systems
 5. Other facility etc.
- Management issues:
 1. Safety issues and disaster management
 2. Multiple destination & focused approach
 3. Lack of tourism service providers

4. Inappropriate implementation & maintenance issues

- Environmental issues

12.3 Eco-Tourism

12.3.1 Definitions

According to United Nations World Tourism Organization (UNWTO), tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes.

Whereas eco-tourism according to World Tourism Organization (UNWTO), all nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature as well as the traditional cultures prevailing in natural areas.

According to National Strategy for Sustainable Tourism, April 2022, Sustainable Tourism or Eco Tourism is defined as tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of the visitors, the industry, the environment and host communities. (Policy from Government of India)

According to Rajasthan Eco-Tourism Policy 2021, eco-tourism is a form of sustainable tourism within a natural or cultural heritage area where community participation, protection and management of natural resources, culture, indigenous knowledge and practices, environmental education and ethics, as well as economic benefits are fostered and pursued for the enrichment of host community and satisfaction of visitors. (Policy - Rajasthan Eco-Tourism Policy 2021)

As per Rajasthan Eco-Tourism Policy the stress of tourism is for sustainable tourism which harnesses the natural and cultural heritage potential along with community participation and hence, this aspect has been taken into consideration while framing proposals for eco-tourism guidelines for Nahargarh Eco-Sensitive Zone.

*Sustainability means not only economic sustainability but sustainability of environment and culture. (National Strategy for Sustainable Tourism April 2022)



12.3.2 Tourism or Eco-Tourism (As per Gazette Notification of Nahargarh ESZ)

As per Sub-point no. 3 of Point no.3 according to Nahargarh ESZ Notification, the guidelines are as under:

- (a) All new eco-tourism activities or expansion of existing tourism activities within the Eco-Sensitive Zone shall be as per the Tourism Master Plan for the Eco-Sensitive Zone.
- (b) The Eco-Tourism Master Plan shall be prepared by the State Department of Tourism in consultation with State Departments of Environment and Forests.
- (c) The Tourism Master Plan shall form a component of the Zonal Master Plan.
- (d) The activities of eco-tourism shall be regulated as under, namely:

- (i) New construction of hotels and resorts shall not be allowed within one kilometer from the boundary of the Wildlife Sanctuary or up to the extent of the Eco-Sensitive Zone whichever is nearer.

Provided that beyond the distance of one kilometer from the boundary of the Wildlife Sanctuary till the extent of the Eco-Sensitive Zone, the establishment of new hotels and resorts shall be allowed only in pre-defined and designated areas for eco-tourism facilities as per Tourism Master Plan.

- (ii) All new tourism activities or expansion of existing tourism activities within the Eco-Sensitive Zone shall be in accordance with the guidelines issued by the Central Government in the Ministry of Environment, Forest and Climate Change and the eco-tourism guidelines issued by National Tiger Conservation Authority (as amended from time to time) with emphasis on eco-tourism.

- (iii) Until the Zonal Master Plan is approved, development for tourism and expansion of existing tourism activities shall be permitted by the concerned regulatory authorities based on the actual site-specific scrutiny and recommendation of the Monitoring Committee and no new hotel, resort or commercial establishment construction shall be permitted within Eco-Sensitive Zone area.

12.3.3 Importance of Eco-Tourism

- To protect and conserve the natural heritage, forests, and wildlife.
- Ecotourism can lead to producing global wealth and employment as it is the fastest-growing segment of the tourism industry.



- Due to the increase in urbanization and degradation of existing forests, wildlife, and natural areas, the public interest is increasing in nature-based tourist places and recreational areas.
- In order to strengthen community control and management of the forests, it is important to generate a sustainable flow of non-extractive financial benefits of forests for the communities, to ensure that the communities take interest in the conservation of forests and wildlife. Eco-tourism is perhaps the only means of achieving this end.

12.3.4 Objectives

- To prepare the Tourism Master plan for Eco-Sensitive Zone, Nahargarh.
- To create the balance between nature and tourism.
- To formulate strategies for promoting eco-tourism.
- To protect and conserve the natural heritage, forests, and wildlife.
- Uplifting the economic condition of the local communities by creating awareness and capacity building.

12.3.5 Eco-Tourism for Nahargarh ESZ

At present there is no eco-tourism activity present in Nahargarh ESZ area.

12.3.6 Methodology

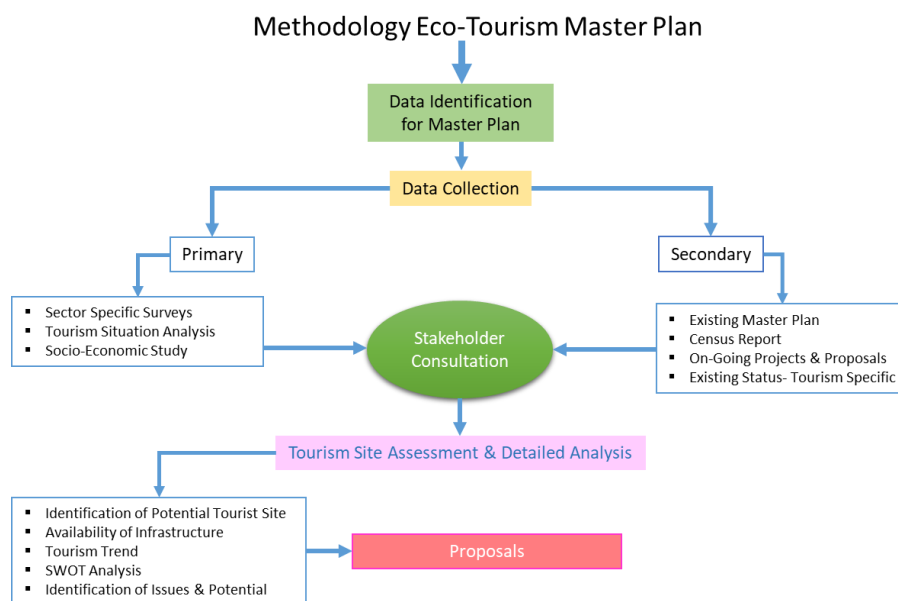


Figure No.: 12.16 Methodology for Eco Tourism Master Plan

12.3.7 Other Forms of Eco-Tourism

In case of Nahargarh suitable form of tourism concluded from analysis are agro-based tourism and cultural (arts and craft) tourism. Based on the context, nature, and practices and in relation to the region's characteristics, eco-tourism is divided into other types as well:

- **Community-based eco-tourism:** This form of eco-tourism implies the promotion of biodiversity conservation, local income and cultural preservation in remote areas. In turn, the implementation of community-based tourism projects requires community empowerment, the improvement of accessibility, the incorporation of tourism products based on natural resources, and the liberalization of price policy. In addition, community-based eco-tourism focuses on the development of local communities and ecological sustainability as environmental responsibility and sensitivity provide social, economic and political benefits to local communities. That is why for this type of tourism, local employment, control, and initiation are necessary.
- **Sustainable eco-tourism:** This form of eco-tourism implies the limitation of a negative impact on the environment, the minimization of negative externalities, the promotion of cultural integrity, and the support of income generation and effective resource management. It goes without saying that developing countries with unique natural environments and cultures may take advantage of sustainable eco-tourism on a first-priority basis. Sustainable eco-tourism programs consider all social, economic and environmental aspects and generate employment for unskilled employees in rural areas through community-based tourism activities dedicated to the preservation of natural eco-systems. In addition, respect to local traditions and rational use of natural resources should be prioritized to attain sustainability.
- **Ecosystem eco-tourism:** In general, the ecosystem includes the physical environment, living organisms, and their feedbacks and interactions. In ecosystem eco-tourism, its basic elements are provided by predation, herbivory, parasitism, and mutualism between abiotic and biotic components. While this type of eco-tourism does not exclude the commercial exploitation of the ecosystem, it depends on integrated management philosophy considering beneficiaries, socio-economic constraints and impacts on the resource base within a realistic spatial and temporal scale. Ecosystem eco-tourism aims to promote tourism activities that may contribute to the maintenance



of the ecosystem's structures and functions. Moreover, it requires the management of biological diversity and entire ecosystems in connection with the tourism experience.

- **Rural eco-tourism:** This type of tourism promotes the combination of tourism and agriculture that provides the local peasantry with better living conditions, more profit, and employment opportunities. As per, National Strategy for Rural Eco-Tourism, 2021: The Ministry of Tourism has recently notified national strategy on rural tourism. Keeping in view that eco-tourism and adventure tourism are largely away from the cities, the strategy for rural tourism is also relevant for promotion of eco-tourism and adventure tourism in the country.

(Source: <https://studycorgi.com/eco-tourism-a-growing-trend-in-andhra-pradesh-india/>)

12.4 Rajasthan Eco-Tourism Policy 2021

The Government of Rajasthan released new Rajasthan's Eco-Tourism Policy in 2021. This policy has been framed with an aim to generate economic benefits after conserving natural areas and attracting tourism in Rajasthan for development under the centre's eco-circuit theme. The policy defines eco-tourism as a form of sustainable tourism within a natural or cultural heritage area where community participation, protection and management of natural resources, culture, indigenous knowledge and practices, environmental education and ethics, as well as economic benefits are fostered and pursued for the enrichment of host community and satisfaction of visitors

12.4.1 Three pillars of Eco-Tourism

The three important pillars on which eco-tourism are based are conservation, communities and interpretation:

Conservation: Eco-tourism will provide effective economic incentives for conserving and enhancing bio-cultural diversity and help protect the natural and cultural heritage of our beautiful state.

Community participation: With increased local community participation ecotourism can prove to be an effective vehicle for empowering local communities to fight against poverty and to achieve sustainable development.

Interpretation: With an emphasis on enriching personal experiences and environmental awareness through interpretation, eco-tourism will promote greater understanding and appreciation for nature, local society, and culture.



12.4.2 Scope of Eco-Tourism

- Organized for environmentally conscious small groups.
- Reduces negative impacts on the natural and socio-cultural environment.
- Promotes protection of natural areas, restoration of heritage/culture.
- Supports local livelihoods by active community participation.
- Increases awareness for conservation of natural and cultural heritage through participatory, interactive, educational, and interpretative, experiences.

12.4.3 Vision, Mission, and Objective of Policy

The vision of this policy is to nurture and project natural, ecological, and cultural richness of Rajasthan in a sustainable manner that is rooted in environment conservation and with a sincere attention to social inclusiveness and economic empowerment.

The mission of the policy is to promote ecological conservation in Rajasthan, to encourage and develop unique, high quality, low impact eco-tourism destinations centred on careful protection of natural and cultural assets, to foster quality educational experience, to empower local communities through creation of livelihood opportunities, poverty alleviation and capacity enrichment.

The main objectives of the Rajasthan Eco-tourism Policy are as follows:

1. Conserve the existing biodiversity, ecosystems, heritage monuments, culture and traditions of the state of Rajasthan.
2. Offer memorable and high-quality learning experience to visitors, and encourage collaborative nature conservation efforts.
3. Promote engagement of local communities in nature tourism in a manner that enriches local economy and encourages sustainable use of indigenous materials through financially viable value chains.
4. Share the benefits of eco-tourism development equitably with the local communities and indigenous people.
5. Provide opportunities to local communities to determine the appropriate presentation of their cultural values by obtaining their informed consent and full participation in planning and management of eco-tourism business.
6. Ensure prior informed participation of all stakeholders by bringing them together on a common platform of understanding eco-tourism.



7. Promote eco-tourism in a sustainable manner based on the 12 Global Sustainable Tourism Criteria (GSTC) based on the four pillars including sustainable management, socio-economic impacts, cultural impacts, and environmental impacts.
8. Reduce negative impacts of tourism in over exposed areas and divert traffic to other lesser explored destinations.

12.4.4 Guidelines to Achieve Vision and Objectives

1. Eco-tourism plans for target destinations shall be conservation centric and in consonance with Tourism Policy of the State, Management Plan in case of Protected Areas and Working Plans in case of other Forest Areas.
2. All eco-tourism activities shall be in conformity with the existing environmental laws of the country, including Wildlife (Protection) Act, 1972, the FCA 1980, the Environment Protection Act, 1986, the Environment (Protection) Rules 1986 and Rules for Eco-Sensitive Zones, NTCA Guidelines, Rajasthan Tourism Policy 2020, directives of Hon'ble Supreme Court of India and National Green Tribunal.
3. Eco-tourism activities will aim at building awareness among all stakeholders of the value and benefit of conserving the natural heritage area.
4. All eco-tourism activities shall have the local communities and conservation at its foci and shall strive for providing stimulus to local economy by generating livelihoods.

12.5 Strategies to Achieve the Objectives of the Eco-tourism Policy

1. Organizational Strategy and Institutional Arrangements: Rajasthan Ecotourism Policy 2021 shall be implemented by Rajasthan Forest Development Corporation and administered by the Forest Department Government of Rajasthan.
2. Rajasthan Ecotourism Development Society (REDS): This society shall advice in achieving the vision, mission and objectives of Ecotourism Policy with regard to forests, protected areas and other natural areas not directly under the control of the Forest Department.
3. Rajasthan Forest Development Corporation (RFDC): The Corporation shall foster eco-tourism development that combines both nature-based and cultural attractions in a complementary way within the context of environmental and socio-cultural sustainability. It will promote eco-tourism development and management that emphasizes the 'sense of place' that is unique to each destination.



4. District Level Committee: It shall be constituted under the Chairmanship of the District Collector with Deputy Conservator of Forests (Territorial) as the Member Secretary and shall have members from other stakeholder departments like revenue, tourism, tribal development, rural development etc. to promote, manage and regulate eco-tourism sites.

5. Strategy for managing eco-tourism sites: For administrative purposes, the eco-tourism destinations and policy mechanisms for governing the eco-tourism activities will be as under:

- a. Eco-tourism destinations falling in areas within the control of the State Government.
- b. Eco-tourism activities in areas shall be governed as per the NTCA guidelines issued in 2011. For destinations falling under Protected Areas, Chief Wildlife Warden will draft rules for regulating the recreation and wildlife experience.
- c. For all other areas which are not a part of PA or PT areas, the forest department shall issue a set of rules under Section 26 (d) and Section 76 of the Rajasthan Forest Act to facilitate entry and regulating eco-tourism activities like experiencing nature, wildlife – wilderness experience, camping, trekking, angling etc. along with detailed dos and don'ts.
- d. Eco-tourism sites falling under the Eco-Sensitive Zones of the protected areas will be governed as per the Eco-Tourism Master Plan which shall be prepared by the Forest Department in consultation with the State Department of Tourism.
- e. Eco-tourism destinations other than those with the Forest Department, which fall in the jurisdiction of local bodies like Gram Panchayats and Nagar Palikas - tribal tourism, village tourism, agri-horti tourism, herbal tourism, home stays, artisan & folk tourism etc. will be regulated and governed by the Rajasthan Tourism Policy 2020.
- f. Eco-tourism destinations which are basically a part of government land but the tourists use the facilities of the private players to enjoy the eco-tourism experience – Concept of Nature Conservancies; limiting disturbance to privately owned property while nature/wildlife viewing. The Forest Department in consultation with the Tourism Department, will issue a set of guidelines for regulating this activity with an aim of minimizing the disturbance to wildlife.



6. Eco-tourism Partners: The five main partners in eco-tourism initiative are; who is the owner of the facility, the person visiting the area for experience, the public entity, body corporate or the private entrepreneur who is managing the eco-tourism destination, we may call him Guide or Interpreter, who will be providing the interpretation, guiding and other intellectual inputs regarding the destination to make the experience memorable; will be the main beneficiary of the initiative and the Government (Forest and Tourism Departments) who are leveraging the interdependencies of the partners to make the conservation initiatives successful.

7. Eco-tourism Management Plan

8. Eco-tourism Product Development, Promotion, Publicity & Marketing: for the purposes of branding, promotion, marketing Rajasthan Eco-tourism Policy 2021 shall be considered to be a part of Rajasthan Tourism Policy and shall be promoted by the Rajasthan Tourism Department, Government of Rajasthan.

9. Funding and budgetary support: The Forest Department shall allocate funds from annual departmental budget available under various schemes for development of eco-tourism. Funds apportioned for eco-tourism activities and will be made available to the Rajasthan Forest Development Corporation (RFDC). The funds will then be provided to the district units on the basis of the approved annual action plans.

10. Sharing of revenue benefits: The revenue generated will be deposited by RFDC in an escrow account and shall be used for development of eco-tourism activities of that area. The funds accrued from eco-tourism activities will be utilised for community development, conservation initiatives and running of eco-tourism facilities. The Forest Department will develop a model for revenue sharing in consultation with RFDC. A separate model of revenue sharing will be developed for facilities such as Tiger Reserves/Biological Parks which are already ticketed facilities. The RFDC shall ensure that part of the revenue generated will be used to address local livelihood development issues, human wildlife conflict management and conservation through eco-development. The Forest Department will issue guidelines for the same. (Rajasthan Eco-Tourism Policy 2021)



13. HERITAGE AND TOURISM PROFILE OF WLS

There are two main categories of tourism destinations in the Nahargarh Eco-sensitive zone and wildlife sanctuary area:

- Nature based heritage
- Manmade heritage

13.1 Nature Based Heritage

Natural Heritage sites comprise valuable natural assets of the area such as natural waterfalls, cliffs, mountains, caves, forests, valleys etc. Natural Heritage sites identified with WLS are as under:

- Nahargarh Biological Park, Kukas
- Ram Sagar Lake, Shisyawas
- Kadamb Kund, Brahampuri
- Prabhat Puri ka Khola

13.1.1 Nahargarh Biological Park (NBP)

NBP is part of Nahargarh Wildlife Sanctuary, and it is interesting for the tourists to enjoy lion safaris. Chief Minister (CM) Vasundhara Raje inaugurated the park, and it has now become a convenient breeding centre for lions and a special tourist attraction in the state. The park has rich flora and fauna resources; it has an admin to conserve the wildlife diversity of the Nahargarh. Approximately 15000-20000 tourists from the domestic and international category visit here while approximately 100,000 tourists monthly visit during peak seasons. The ideal staying duration of visitors ranges between 1-2 hours.

The site is well maintained and accessible easily via road. All the basic and necessary facilities are available at the site. Only the issues of nature interpretation centre, and cloakroom is merely absent. Below are some issues as per the existing situation analysis:

- Center for nature interpretation is missing from the site
- Lack of Cloakroom





Figure No.: 13.1 Existing Site map of Nahargarh Biological Park



Figure No.: 13.2 Existing Site Photograph of Nahargarh Biological Park

13.1.2 Kadamb Kund, Brahampuri

Kadamb Kund is located at the backside of the Gator Road in Krishna Nagar, Brahampuri near there foothill of Nahargarh. Mainly domestic and international tourists approximately 15000- 20000 monthly visit here. The staying duration of the visitors is generally around 1 hour.

The Kund area does not have any infrastructure facility. The area is served by government water supply. Kund has staircases which are already in good condition. The approach road is cemented and is in good condition. The major source of water in the Kund is rainwater only. Below are some issues as per the existing situation analysis:

- Non-availability for public transport
- Directional signages are missing
- Facilities like sitting benches, toilet, drinking water is missing for the site
- Yatri sheds aren't installed onsite.



Figure No.: 13.3 Photographs of Kadam Kund Brahmapuri

13.1.3 Ram Sagar Lake

Ram Sagar Lake is located near Nahargarh Wildlife Sanctuary. It has very large catchment area and has an ancient value as this area use to be hunting areas of kings. It is good source for drinking water for animals as well as ground water recharge. It is connected through unpaved roads with in the Nahargarh Forest. Currently the lake does not have any water left, till the year 2016, the lake was filled with water and the embankment may have been damaged after this. The eco-system of this lake along with Odhi Bhawan Lake is important for wildlife.

The lake does not have any tourist facilities available. It lacks with the facilities like drinking water, toilet facility, road infrastructure, etc. There are two rain shelters available near the area but it does not have any seating facility. Few seating benches are installed near the lake but are not in good condition. Below are some issues as per the existing situation analysis:

- Bad unpaved access to the site
- No facility for public transport is available
- No signage on the main road
- Bad condition and inadequate seating furniture
- No facility of public toilet
- No facility of drinking water
- No facility of solid waste management
- No installation of public light
- No installation of CCTVs Camera



Figure No.: 13.4 Existing Site map of Ramsagar Lake



Approach Road



Rain Shelter



Seating Place



Signages



Approach
in the lake



Seating Bench

Figure No.: 13.5 Photographs of infrastructure of Ramsagar Lake



Figure No.: 13.6 Photographs of Ramsagar Lake

13.1.4 Prabhat Puri Ka Khola

It is a local place famous among local tourists yet, but it has immense natural beauty around. This site is an ideal location to visit during rainy seasons to view the natural hilly landscape, which makes it beautiful. Local tourists have approximately 500-1000 monthly visits while it is approximately 2000-5000 tourists during monsoon season. The staying duration of the visitors is generally around 1-2 hours bath at Prabhat Puri Ka Khola waterfall during monsoon rains. The existing situation of available infrastructure is poor and basic amenities are not available at this site. Below are some issues as per the existing situation analysis:

- No facility of public transport is available
- No signage on the main road
- No adequate seating furniture
- No facility of public toilet
- No facility of drinking water
- No facility of solid waste management
- No installation of public light

- No installation of CCTVs Camera



Figure No.: 13.7 Photographs of Prabhat Puri ka Khola



Approach Trek



Water Supply Facility



Hanuman Temple



Seasonal Pond

Figure No.: 13.8 Photographs of Prabhat Puri ka Khola

13.2 Manmade Heritage

Jaipur, popularly known as the "Pink City of India", is the capital city of Rajasthan. This heritage city is part of the "Golden Triangle" formed between Agra- Delhi- Jaipur, and it is also observed that every international tourist visiting India, visits Jaipur also. Besides fort and fortress, this city offers several unexplored destinations for nature-based tourism.

13.2.1 Important Tourist Sites and Infrastructure Availability

Table: 13.1 List of Protected Monuments under Central Archaeology Department in WLS

Sr. No.	Name of the Sites
1	Sun Temple, Amer
2	Jama Masjid / Akbari Masjid, Amer
3	Laxmi Narayan Temple
4	Shri Jagat Shiromani Temple, Amer

Table: 13.2 List of Protected Monuments under State Archaeology Department in WLS

Sr. No.	Name
1	Sudarshana/ Nahargarh
2	Cenotaphs of Gaitore
3	Charan Mandir
4	Wall Paintings of Chhatari near Prachin Govind Devaji ka
5	Temple Amber Ghati
7	Sun Temple, Amber
8	Amber Palace on Hill, Amber
9	Prachin Mahal below Hill, Amber
10	Panna Meena Ka Kund, Amber
11	Dalaram Garden, Amber
12	Sanghi Temple, Amber
13	Narsingha Temple, Amber
14	The rampart of old Amber town, Amber
12	Sanghi Temple, Amber
13	Narsingha Temple, Amber
14	The rampart of old Amber town, Amber

13.2.2 Other Important Historical Sites under

1. Amer Fort
2. Nahargarh Fort
3. Jaigarh Fort, Amer
4. Sagar Lake, Amer
5. Panna-Meena Kund, Amer
6. Gator ki chatriyan, Brahmpuri
7. Odhi Bhavan, Shishyawas
8. Kuntalgarh Fort, Shishyawas

13.2.3 Other Important Religious sites

1. Amba Mata Temple, Kuntal
2. Bhuteshwar Mahadev Temple, Shishyawas
3. Chode Ke Hanuman Ji Temple, Amer
4. Ganesh Temple, Near Gator
5. Jatti Ke Balaji Temple, Amer
6. Jama Masjid, Amer
7. Kadmeshwar Mahadev Temple, Amer

Map Showing the location above prominent tourist sites is attached in Annexure- 14.



13.2.4 Existing Scenario of Important Historical Sites under WLS

13.2.4.1 Amer Fort

The Amer Fort is one of the top tourist locations in Jaipur. Cradled on the top of a hill near Jaipur lies the Amer Fort, one of the most magnificent palaces in India. Also commonly known as the Amber Fort, this majestic building with its maze-like passages and serpentine staircases is an architectural masterpiece with significant importance in Indian history. Amer Fort is clad in pink and yellow sandstone and is part of an extensive complex. This fort was built by Maharaja Man Singh I in the year 1592; Amer Fort served as the primary seat of the Rajput Rulers. Amer Fort is known for its artistic style elements. With its large ramparts and series of gates and cobbled paths, the fort overlooks Maota Lake, the primary water source for the Amer Palace. Amer Palace is an excellent example of Rajput architecture style, including domestic and international tourists; probably 1-2 lakh tourists visit this palace annually, while in the peak season, the number of tourists also touches 4-5 lakhs. The visitors' stay is generally around 2-3 hours, particularly in the evening.

Amer Fort is one of the most important tourist sites in Jaipur. The site is well connected with the road network. Fort starts with the beautiful Kesar Kyari Garden, Dalaram Bagh and Maota Lake at the bottom of the fort. The approach road to the fort is stone paved. There are two ways to reach the fort; the main approach road through Suraj Pol, which leads to the Courtyard (Jalebi Chowk) the front part of the fort, is open for pedestrians and elephant riders. The second entrance is from the Western side of Jalebi Chowk, mainly used to reach the fort using vehicles. A parking facility for the vehicles has been provided near the fort. Amer Development and Management Authority does conserve the fort. The fort has a tunnel connecting directly to Jaigarh Fort. Below are some issues as per the existing situation analysis:

- The site is lacking behind a cloakroom.





Figure No.: 13.9 Existing site map of Amber Fort



Exterior View of Amer Fort



Maota lake & Kesar Kyari Garden



Jaleb Chowk



Ganesh Pol Entrance



Sheesh Mahal



Diwn-e Aam



Pathway

Figure No.: 13.10 Photographs of Amer Fort



Parking Facility



Drinking Water Facility



Reception

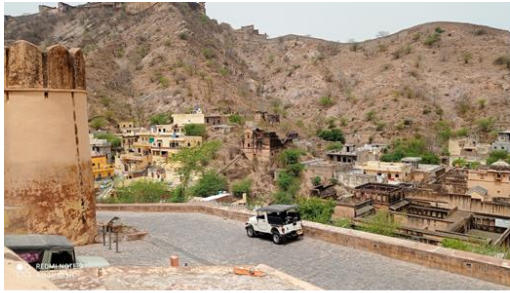
ATM Facility

Security



Seating Facility

Figure No.: 13.11 Photographs of Facilities in Amer Fort



Approach Road



CCTV Camera



Signage



Security Gate



Dustbins



Signages



Approach Road



Medical Facility



Toilet Facility

Figure No.: 13.12 Photographs of Facilities in Amer Fort

13.2.4.2 Nahargarh Fort

The fort was built in 1734 by Maharaja Swai Jai Singh-II, taking its name from a prince called Nahar Singh. Legend has it that the prince's grave was disturbed during construction and his ghost began wreaking havoc. Only when the king decided to get a shrine constructed for the prince to reside in, the construction work went on smoothly after that and named the fort Nahargarh.

This fort is one of the most popular tourist attractions of Jaipur, and it has a wall that connects it to the nearby placed Jaigarh Fort. The fort remained invincible but has witnessed several important battles, such as the Event of Treaty between the Marathas and the rulers of Jaipur in the 18th century. The fort was also a refuge for several Europeans at the time of the Sepoy Mutiny of 1857, including the wife of a British resident. At the same time, exploring the palace inside the fort, where Maharaja Ram Singh and his nine wives lived. There are nine separate two-story apartments here, one for each queen. The doors and windows are decorated with intricate floral motifs. These decorative flourishes indicate how the apartments may have appeared when the palace was still used as a royal residence.

The pictures of dotted cannons around the walls remind visitors of the fort's original purpose as a strategic defense structure. The city is at its most photogenic as the dying rays of the sinking sun are strewn across it and the skyline's lights begin to twinkle. For a better look at Jaipur's most iconic buildings, tourists bring binoculars along with them. This fort is an excellent example of Rajput architecture style. Probably 1-2 lakh tourists, including domestic and international, visit this palace annually, while in the peak season, the number of tourists also touches 4-5 lakhs. The visitors stay is generally around 3-4 hours, particularly in the evening.

The Fort is very famous among domestic as well as international tourists. Fort is well connected through a road network and has all the basic facilities such as parking, street light, reception centre, tourist information centre, drinking water supply, ATM facility, cafe and restaurants, parks, and open spaces. The existing structure of the fort is well maintained. Below are some issues as per the existing situation analysis:

- The facility of public transport is not available for this site.
- Wayside facilities are missing.



- The site is lacking behind a cloakroom.
- There is no interpretation centre. There is no museum depicting the history and development of this fort over the period.
- There is no light and sound show at present, however, this needs to be checked whether it can be started again at the earlier location or not.





Figure No.: 13.13 Existing Site Map of Nahargarh Fort



Figure No.: 13.14 Existing Site photo of Nahargarh Fort



Figure No.: 13.15 Facilities Available on Nahargarh fort



Internal Pathways



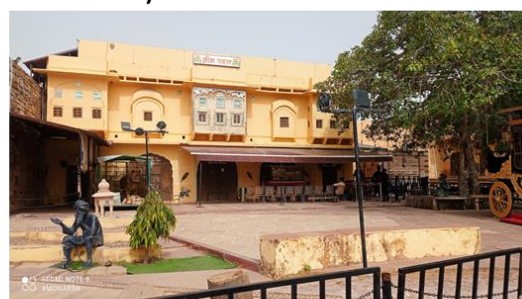
Drinking Water Facility



Security Cabin



Toilet Facility



Restaurant



Drinking Water Facility



Office



Parking Facility



Figure No.: 13.16 Facilities Available on Nahargarh Fort

13.2.4.3 Jaigarh Fort

During the reign of the Mughal Emperor Shah Jahan, Jaigarh Fort, located 150 miles South-West of Delhi, became one of the world's most efficient cannon foundries mainly due to the abundance of iron ore mines in the vicinity of the fort. The cannon foundry Jaigarh Fort had a massive wind tunnel that sucked the air from the high mountains into its furnace, creating temperatures as high as 2,400 °F (1,320 °C); the heated air would melt the metal. The molten metal would fill a reservoir chamber and pass into a cannon mould in the casting pit. Most of those cannons were massive, mostly 16 ft long and had to be prepared within a single day. The Rajput also built a large ingenious mechanical device that had a precision gear system driven by four pairs of oxen; the device was used for hollowing out the cannon barrels. Ultimately Jai Singh II is known to have moulded the great 'Jaivana Cannon' by utilizing the vital foundry and devices inside Jaigarh Fort.

Sawan Jai Singh II erected the Jaigarh fort, which is situated atop the Hill of Eagles, in 1726 AD. Jaigarh Fort, which stands 500 feet above sea level, provides expansive views of the surroundings. It contains the 'Jaivana Cannon', the biggest cannon on wheels in the entire globe. The fort has several additional attractions, including Laxmi Vilas, Lalit Mandir, Aram Mandir, and the Vilas Mandir.

Sandstones make up Jaigarh Fort, which covers an area of 3 sq.km. Jaigarh Fort, built to guard Amer Fort, is considered Jaipur's most powerful structure. This location, also known as 'Victory Fort', served as a warehouse for all the war armour, cannons, weapons, etc. Approximately 5000-10000 tourists monthly visit this site whereas 50000-100000 tourist visit during peak season. The average stay at the site ranges between 2-3 hours. Jaigarh Fort is located on the hill top connected from Amer road. The fort is maintained by private body and has adequate tourist facilities such as parking, tourist information center, tourist guides, toilet and drinking water facility, food court etc. for public. Below are some issues as per the existing situation analysis:

- There is no cloakroom.





Figure No.: 13.17 Existing Site Map of Jaigarh Fort



Figure No.: 13.18 Facilities Available in Jaigarh fort



Signages

Parking Facility

Temple Complex

Figure No.: 13.19 Facilities Available in Jaigarh fort



Court Complex



Parking Area



Toilet Facility



Garden Area



Museum



Restaurant

Figure No.: 13.20 Photographs of Jaigarh Fort

13.2.4.4 Sagar Lake, Amer

The great King, Sawai Jai Singh, built a rectangular-shaped man-made lake, which is divided into two parts- the Upper Sagar and the Lower Sagar, and kept a check on the water table of the region. It was designed to connect with various step wells in the region, which automatically filled up once the 'Sagar' had reached its capacity. Tucked away beyond Kheri Gate and the Anokhi Museum, the upper Sagar Lake can be reached by car. But the real adventure starts after crossing the front side and walk on the side path to explore the hidden beauty of lower Sagar. The Lower Sagar is a hidden lake which is covered by huge Aravali ranges; it can be seen neither from the front side nor from the city.

There is an old Shiva temple, Balaji Temple and Vaishno Mata Temple. The best time to visit this place is during sunset and sunrise hours when the sky turns into a golden labyrinth. The site an ideal attraction for the domestic & international tourists. Approximately 2000-3000 tourists monthly visit here while 15000-20000 tourists monthly visit here during peak season. The staying duration of the visitors is around one hour.

Lake is divided into two parts: Lower Sagar and Upper Sagar. The lake is currently in horrible condition. The Upper Sagar Lake is still in better condition as compared to the Lower one due to significantly less human intervention in the Upper past. Balaji Temple is situated in the middle of the Upper Sagar Lake. The government has developed the area surrounding the lake. Earlier but due to lack of maintenance, the condition of available infrastructure is getting degraded day by day. Facilities like seating benches, rain shelters, street lights, and parking have been provided but are currently in bad condition. It can be depicted in the pictures below. Maintenance of these facilities is required on an immediate basis. Water supply, sanitation and solid waste management facility are not available at the site, which is an essential requirement for such a tourist place, immediately. Below are some issues as per the existing situation analysis:

- The site has ideally less tourists throughout the year, but during the peak seasons a sum of 15000 to 20000 visits from domestic and international categories, hence, there is no reception centre available for this season.
- The site is lacking behind a cloakroom.



- Public transport is not there.
- Drinking water facility is missing there.
- Public toilet is there but it is not functional.
- CCTV cameras are not installed.
- There is no provision for the security guards.



Figure No.: 13.21 Existing Site map of Sagar Lake



Figure No.: 13.22 Existing Site map of Uppar Sagar Lake



Approach Road



Parking Area



Toilet Structure



Seating Arrangement



Lower Sagar Lake



Approach Road- Upper Sagar



Walk way at lower Sagar

Figure No.: 13.23 Photographs Site photo Sagar Lake



Rain Shelter and Seating



Existing Structure



Catchment Area



Water Supply



Open Well



Temple Complex

Figure No.: 13.24 Photographs Site photo Sagar Lake

13.2.4.5 Panna Meena Kund

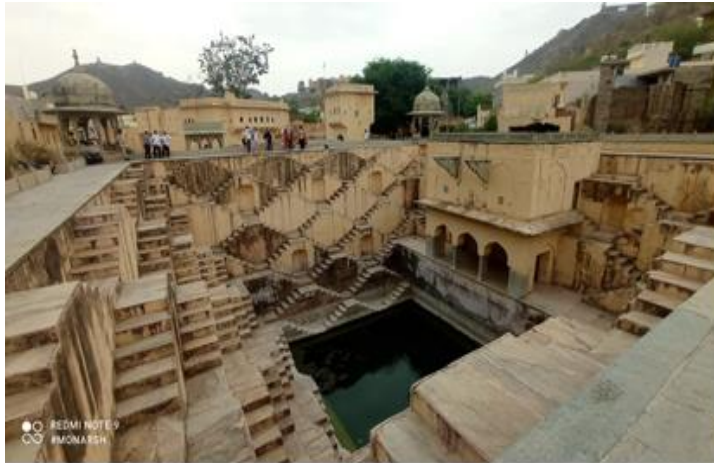
Panna Meena Kund is located at the bottom of Amer Fort in Amer Town. The Stepwell is identified as State Archeology Department and is a famous tourist destination. It is thought that this stepwell was built sometime in the 16th century to collect the monsoon rains. This was when Amer was still the Rajput Kachwaha capital before it was moved to Jaipur. The dry landscape in Rajasthan often meant that there were many water shortages in the city. So, to provide a solution, this stepwell was built to collect water and acted as a reservoir for Amer. The site is equally important for the tourist of domestic and international categories and approximately 15000-20,000 tourists monthly visit this site whereas 100,000 tourist monthly visits during peak season. The staying duration of the tourists is generally around 1 hour.

The step well is good in condition, the premises is equipped with basic infrastructure facilities like toilet, drinking water and seating facility. Access to the kund is prohibited for the tourists. Below are some issues as per the existing situation analysis:

- There is no reception centre available.
- There is no cloakroom.



Figure No.: 13.25 Existing Site Map of Panna Meena ka Kund



Existing Kund



Facilities Near Premises



Premises



Seating Arrangement



Walkway Around the Kund

Figure No.: 13.26 Existing Site photo Panna Meena Kund

13.2.4.6 Gaitor ki Chatriyan

Gaitor ki Chatriyan is the royal crematorium grounds for the Kachwaha, a Rajput clan that ruled in this region. The site was designated by the founder of Jaipur in the 18th century. The royals' cenotaphs are scattered throughout the complex. These are beautiful pieces of architecture to behold. In Jaipur, Rajasthan, there is a historical location called Gator that falls in the foothills of the Fort Nahargarh. Numerous important archaeological artefacts have been discovered here so far. Prominent landmarks including the graves or *chhatris*, of ancient monarchs, etc. are notable here. Maharaja Sawai Jai Singh, the creator of Jaipur, owned the most exquisite umbrella, a duplicate of which is also on display in the Kensington Museum in London. The site is visited by a lesser number of tourists; although approximately 3000-50000 tourists of domestic & international categories visit here. The stay duration of tourists ranges between 1-2 hours.

Gaitor ki Chatriyan is owned, run, and maintained by the royal family of Jaipur. The structures are very well maintained and are equipped with basic facilities like a toilet facility, seating arrangement, drinking water, etc. The premises are secured with CCTV and security personnels. Nominal entrance fees are charged to enter the premises. The status of the availability of infrastructure and facilities can be depicted. Below are some issues as per the existing situation analysis:

- There is no facility for public transport.
- There is no signage from along with the main road.
- There is no cloakroom.

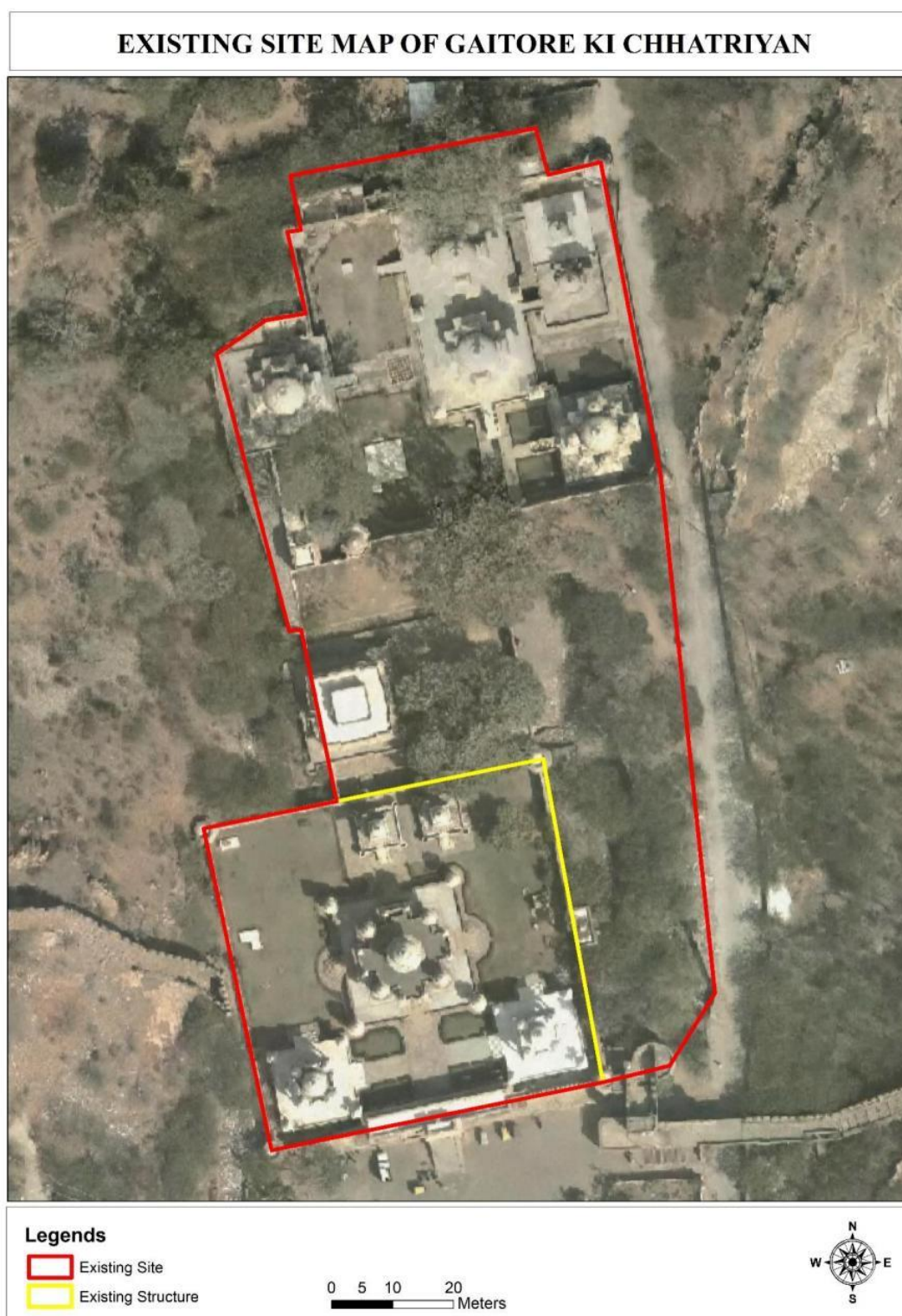


Figure No.: 13.27 Existing Site map of Gaitor ki chatriyan



Entrance Gate



Internal View



Source of water



Existing Structure



Internal Walkways



Existing Structure

Figure No.: 13.28 Photographs of Gaitor ki Chatriyan

13.2.4.7 Odhi Bawan

Odhi Bhawan is located in the middle of the Nahargarh Forest Area near NBP in Sishyawas Village. It is said that this was used by the kings to those who come here for hunting purposes. The structure is surrounded by the forest area. There is a manmade water body behind the main structure, which is named Lalit Bhawan. Only local tourists from surrounding villages visits this site, and this number is approximately 500-1000 tourists per month who ideally stay for 1 hour at the site. However, this site has a lot of potential to attract domestic as well as international tourists, but this site is not well known, and recognized as an important tourist site so far.

There are 3 structures in Odhi Bhawan, the main structure is named Lalit Bhawan. The existing structure is still in good condition but needs maintenance. The site is identified as a prominent location for development for tourists. A water supply facility is available here. The toilet facility is available within the premises but needs maintenance. Apart from it, the structure is still in good condition but the doors and windows are already broken, so they need maintenance. The approach road is *kaccha* and not in good condition. The site is easily accessible. Below are some issues as per the existing situation analysis:

- The site is not well recognized, and it needs extra efforts to earmark this potential site as the center of attraction among domestic and international tourists.
- There is no facility for public transport
- The quality of the approach road is not good
- Street furniture is not available
- The facility of drinking water is not available.
- A facility for a public toilet is not available.
- Public light on the premises is not available
- A facility for waste management is not available
- CCTV cameras for safety concerns are missing there.
- There is no signage along with the main road and at the site.





Approach Road



Signages



Water Supply

Figure No.: 13.29 Photographs of Odhi Bhawan



Existing Structure



Existing Structure



Signages

Figure No.: 13.30 Photographs of Odhi Bhawan



Central Courtyard



Drainage System



Toilet



Front View (Lalit Niwas)



Temple



Internal Drains

Figure No.: 13.31 Photographs of Internal Structure of Odhi Bhawan

13.2.4.8 Kuntalgarh Fort or Old Amer Fort

It is now a ruin, and this fort was built for the purposed of defense of Amer before the current Amber fort. Unfortunately, this for t is not well known and it is a ruin and in dilapidated condition without its renovation and conservation practices. Only local tourists from surrounding villages visits this site, and this no. are approximately 500-1000 tourists per month who ideally stay for 30 minutes to 1 hour at the site. However, this site has a lot of potential to attract domestic as well as international tourists, but this site is not well known and recognized as an important tourist site so far. The site has not a basic facility such as drinking water, public toilet, etc. Below are some issues as per the existing situation analysis:

- The site is not well recognized, and it needs extra efforts to earmark this potential as the center of attraction among domestic and international tourists.
- There is no facility for public transport and quality of the approach road is bad
- Street furniture is not available
- The internal parts and their accessibility is very poor
- The facility of drinking water, public light & public toilet is not available.
- A facility for waste management is not available
- CCTV cameras for safety concerns are missing there
- There is no signage along with the main road and at the site.



Figure No.: 13.32 Existing Site map of Kuntalgarh Fort



Figure No.: 13.33 Photographs of Kuntalgarh Fort

13.2.5 Existing Scenario of Important Religious Sites under ESZ

13.2.5.1 Chamunda Temple Achrol

Chamunda Devi Temple, dedicated to the goddess Chamunda, is a revered religious site located in the picturesque surroundings of Achrol in the Aravalli hills near Jaipur. The

temple holds immense significance for devotees and pilgrims who visit to seek blessings, offer prayers, and partake in religious rituals.

The temple's architecture and design showcase a blend of traditional Rajasthani and Mughal styles, reflecting the rich cultural heritage of the region. The temple complex typically includes a main shrine dedicated to Chamunda Devi, surrounded by smaller shrines and courtyards that add to the spiritual ambiance. Throughout the year, Chamunda Devi Temple attracts devotees and tourists alike, creating a vibrant atmosphere of faith and devotion. Visitors often participate in religious ceremonies, make offerings, and engage in rituals that are an integral part of Hindu worship.

In recent years, efforts to promote religious and eco-tourism around Chamunda Devi Temple have been on the rise. Pilgrims and tourists are not only drawn to the temple for its religious significance but also for the serene natural beauty of the surrounding Aravalli hills. The temple area, along with the nearby hills and forests, has been explored for eco-tourism activities. Nature enthusiasts and trekkers have the opportunity to explore the region, appreciate its biodiversity, and enjoy hiking trails that provide stunning views of the landscape.

As with many religious sites, the preservation of the environment and responsible tourism practices have gained importance around Chamunda Devi Temple. Initiatives aimed at maintaining the natural surroundings, minimizing waste, and promoting sustainable tourism have been in place to ensure the site's long-term sustainability. Local communities play a significant role in supporting the temple and the broader eco-tourism initiatives. Many residents are involved in providing services to pilgrims and tourists, including guides, accommodation, and local cuisine, thereby contributing to the local economy.

13.2.5.2 Govind Devji Temple

The Govind Dev Ji Temple has been a prominent religious and cultural landmark in Jaipur for centuries. This temple is devoted to Lord Krishna and is a vital part of the city's spiritual and cultural fabric. Devotees, both local and from distant places, visit this temple to offer their prayers, seek blessings, and experience the divine presence of Lord Krishna.



The temple's architecture is a fine example of Rajasthani craftsmanship and architectural style. Its distinct pink sandstone structure and intricate designs make it a visual delight. The temple complex typically includes the main sanctum dedicated to Lord Krishna, along with various smaller shrines, courtyards, and pavilions, all adding to its grandeur. Religious ceremonies and rituals are conducted daily at the Govind Dev Ji Temple, following age-old traditions. The atmosphere is filled with devotion, with the melodious chanting of hymns and the mesmerizing sound of bells. The temple is especially renowned for its 'Aarti' ceremony, which takes place multiple times a day and is a highlight for visitors.

The temple continues to be a hub of religious and cultural activities. Devotees throng the temple during festivals such as Janmashtami, Holi, and Diwali to celebrate these occasions with great fervour. These festivals often involve elaborate processions, music, and dance performances that showcase the vibrant cultural heritage of Rajasthan. Efforts have been made to preserve and restore the historical and cultural significance of the Old Govind Devji Temple. The temple's management, along with various heritage conservation bodies, has worked to maintain the architectural integrity of the complex, ensuring that it remains a symbol of Rajasthan's cultural heritage.

In recent years, the temple has also been recognized as a center for cultural promotion. Various cultural events, including classical music and dance performances, lectures, and workshops, have been organized here, attracting artists, scholars, and cultural enthusiasts. The temple area and its surroundings, being located in the heart of Jaipur, have seen increased tourism-related activities. Visitors to the temple often explore nearby historical sites, markets, and restaurants, creating a vibrant atmosphere around the temple.

13.2.6 Existing Scenario of Important Religious Sites under WLS

13.2.6.1 Jatti ke Balaji Temple

Jatti ke Balaji Ji Temple is located near Sagar Lake. The temple is worshiped by local tourists. It is said that the statue of Hanuman Ji emerged on its own, which is also called 'Swaymabhu'. Pilgrims come here for 'Mundan Sanskar' also. The temple is set to be from ancient times. The site has importance for the only local devotees, approximately 500-1000 pilgrims per month visit here, and often stay around 1 hour.



Jatti ke Balaji is a temple located in the forest area of the Amer Region. Temple can be approached from Kheri Gate. The approach road to the temple is an unpaved stone road which makes walking difficult. The mountains surround temple premises. Water supply is available at the premises. Temple has a toilet facility available and it is connected to a septic tank. A kitchen facility is available within the temple premises for pilgrims who prepare '*prashad*' to offer to the god. A water cooler is also available for drinking water. The residential complex of the priest is near the temple itself. Below are some issues as per the existing situation analysis:

- The public transport facility is not there.
- Public toilet facility is not adequate and it is in poor condition for usability
- The approach road is unpaved, which makes walking difficult.
- Public transport and signage on the main road are missing
- CCTV cameras for surveillance and security purpose are not installed yet.
- A rain shelter, street furniture, public light is not there
- Waste collection points/dustbins are not there



Figure No.: 13.34 Existing Site map of Jatti ke Balaji Temple



Water Resource



Toilet Facility



Kitchen and Existing Pathway



Temple Premises



Approach Road



Drinking Water Facility

Figure No.: 13.35 Photographs of Jatti ke Balaji Temple

13.2.6.2 Garh Ganesh Temple,

Garh Ganesh Temple is an 18th century temple of Lord Ganesh in the city of Jaipur. It is located on the hills near Nahargarh Fort and Jaigarh Fort. Garh Ganesha Temple is devoted to Lord Ganesha. Devotees believe that Ganesha is present in the temple in the form of a small child '*Purushakriti*'. In the Garh Ganesha Temple, Lord Ganesha is established in the statue of child Ganesha called '*Vigra Purushakriti*' (without trunk). The temple was built by Maharaja Swai Jai Singh II when he performed the '*Ashwamegha Yagya*' before the establishment of Jaipur. He made the shrine and placed the statue of Lord Ganesha. After that, he kept the foundation stone of Jaipur. He also kept the statue in such a way that Maharaja could be able to see the statue with the help of binoculars from the Chandra Mahal of City Palace, Jaipur. Garh Ganesh also has '*Dhwajadheesh*' Ganesha's temple of Bari-Chaupar as its part.

The total arrangement and management of the temple being overlooked by the Audhchya family. Presently, Shri Pradeep Audichya, the 13th priest of the temple, is the chief priest. The site is mainly important for domestic tourists, and approximately 15000-20,000 tourists monthly visit this site. The staying duration of the tourists is generally around 1 hour.

The Temple is located on a hilltop and can be reached through stairs. The existing structure of the temple is well-maintained. Temple premises is well equipped with basic infrastructure facilities such as street lights, drinking water facility, toilet facility, seating area, rain shelters, etc. There are two different staircases to reach the temple, but both lack basic facilities such as no drinking water facility enroute to the temple as well as the stair open and does not have any rain shelter for the tourist. As the temple is located at a high altitude, the scenery from the temple is very pleasant and gives a clear view of the city. The majority of pilgrims visit the temple on Wednesday and Sunday. Although the domestic tourist footfall is more in the temple due to its historical importance and has the potential for development as a tourist attraction. Hence the site needs to be developed to attract tourist. Below are some issues as per the existing situation analysis:

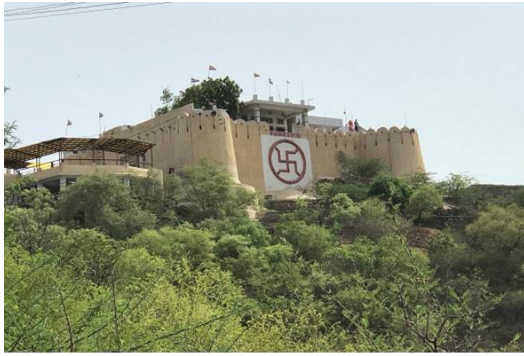
- The public transport facility is not there.
- A reception centre is missing.



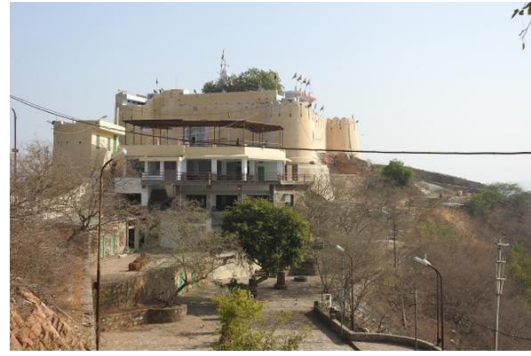
- The cloakroom is not there.
- The signage on the main road is missing.
- No adequate street furniture.
- No security guards are there.



Figure No.: 13.36 Exiting Site Map of Garh Ganesh ji Temple



Temple site



Temple Complex



Entrance Gate



Approach Stairs



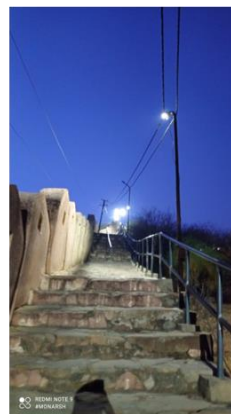
Approach Stairs



Rain Shelter



Recreational Place



Street Lights



Drinking Water Facility

Figure No.: 13.37 Photographs of Garh Ganesh Temple

13.2.6.3 Chode ke Hanuman Ji Temple

Chode ke Hanuman Ji Temple is located on the hill top of Amer. It is believed that the temple is of ancient times and is more than 500 years old. It is mostly visited by people from surrounding villages. Status of existing infrastructure and facility is mentioned below:



Figure No.: 13.38 Existing map of Chodhe ke Hanuman ji



Approach Road



Temple Premises



Temple Structure



CCTV and Sound System

Figure No.: 13.39 Photographs of Chodhe ke Hanuman Ji

13.2.6.4 Bhuteshwar Mahadev Temple

Bhuteshwar Mahadev Temple is located at the hill terrain of Kuntalgarh Fort Hill in Sishyawas Village. Only local tourist approximately 500-1000 visits this temple and these tourists stay for 15-30 mins at this temple. The approach road to the temple is in very bad condition and it is unpaved stone gravel road. Basic facilities such as water supply, toilet, and electricity are available. Below are some issues as per the existing situation analysis:

- Bad unpaved access way.
- The public transport facility is not there.
- The signage on the main road is missing.
- No adequate seating furniture.
- No public toilet.
- No light in the temple premises.
- No facility for solid waste management.





Figure No.: 13.40 Existing map of Bhuteswarnath Mahadev Temple



Temple Entrance



Baori Near Temple



Water Supply



Drinking Water Facility



Shop in front of Temple



Approach Road



Temple Area

Figure No.: 13.41 Photographs of Bhuteswarnath Temple

13.2.6.5 Kadmeshwar Mahadev Temple

Kadmeshwar Mahadev Temple is located in the Amer region surrounded by the hills. The temple has basic facilities within the premises.



Figure No.: 13.42 Existing site map of Kadmeshwar Mahadev Temple



Existing Temple



Open Kitchen Area



Drinking Water Facility



Temple Complex



Baori

Figure No.: 13.43 Photographs of Kadmeshwar mahadev Temple

13.2.6.6 Jama Masjid

Jama Masjid is located in Amer town and is identified as a monument by Central Archaeological Department. On old Delhi Road at Amer, the Jama Masjid is located. Raja Bharmal carried out Emperor Akbar's request to have the Jama Masjid, also called the Akbari Masjid, completed in 1569. The Masjid is an attraction of localized tourist only.

Masjid is located on Jaipur-Delhi Road. Masjid is in good condition and maintained well, apart from seating furniture and CCTV cameras, all basic facilities like water, toilet, compound wall, signages etc. are available at this site. Below are some issues as per the existing situation analysis:

- CCTV cameras are not there
- Furniture for seating facility is not available





Figure No.: 13.44 Existing Site of Jama Masjid



Figure No.: 13.45 Photograph of Jama Masjid

13.2.6.7 Amba Mata Temple

Amba Mata Temple is located towards North of Maila Bag and towards South West of Kuntalgarh Fort and it is very famous amongst its devotees. It is a specific site for trekking adventures who wish to trek on mountainous surface. Tourist need to trek to the temple either from Sagar Lake via Kuntalgarh Fort or else it can also be reached from Bhuteshwar Mahadev Temple of Sishyawas. Approximately 500-1000 pilgrims per month visits here and usually stay for 30 minutes -1 hour.

The temple lacks with the basic facilities like bad approach road, public transportation is missing, bad approach and accessibility to various internal parts absence of street furniture, drinking water, inadequate public toilets, absence of public light, and rain shelters as well as it is not easily approachable due to its location. Both approach ways are made of unpaved stone tracks. Below are some issues as per the existing situation analysis:

- Bad unpaved trekking way.
- Public transport facility is not there.
- Approach and accessibility to various internal parts is very bad.
- The signage on the main road of temporary nature while signages in the premises are missing.
- No public toilet.
- No drinking water facility.
- No facility for rain shelter.
- No adequate seating furniture.
- No CCTV camera.
- No light in the temple premises.
- No facility for solid waste management.





Figure No.: 13.46 Existing Site of Amba Mata Temple



Figure No.: 13.47 Photographs of Amba mata Temple

14. TRAFFIC & TRANSPORTATION STUDIES

14.1 Introduction

Traffic and transportation studies refer to the examination and analysis of the movement of people, vehicles, and goods within a particular area or transportation system. These studies are conducted to understand and address various transportation related issues, including traffic congestion, transportation infrastructure planning, safety concerns, and efficiency improvements.

Traffic and transportation studies play a crucial role in guiding transportation planning, policy-making, and infrastructure development to create efficient, safe, and sustainable transportation systems that meet the needs of communities and support economic growth. Jaipur is one of the important tourist destinations in the country. Situated in the North-West part of India, it is referred to as the 'Pink City'. It is located approximately 260 km from the national capital Delhi, nearest tourist destinations from Jaipur are Ajmer (135 Km), and Agra (225 Km). The location of Jaipur is in such a way that it connects to NCR significantly and creates high potential for various development.

Nahargarh Eco-Sensitive Zone is well connected with the road network it is located on the Western side along the National Highway-248, which is a major important connectivity link between Jaipur and Delhi. Moving from Delhi towards Jaipur the highway intersects with the ESZ boundary initially at village Achrol, thereafter it comes parallel along the boundary of ESZ till Kukas. Approximately 6 km stretch of NH-248 falls inside the ESZ Boundary. The proximity of the highway ends with the ESZ on the East of Mansagar Lake with a mesmerizing view of Jalmahal. The existing road network and connectivity map is attached as Annexure- 15.

14.2 Traffic Surveys and Studies within ESZ

The collection of necessary data plays a key role in figuring out the existing scenario and traffic characteristics of the area, both primary and secondary data related to transportation have been collected through various surveys and studies. At the initial stage visual survey has been conducted to identify the existing traffic scenario of the important historical as well as tourist locations of ESZ, such as the availability of basic infrastructure facilities like parking space, road connectivity & available road width,



public transport, accessibility, pedestrian facility etc. The details of the survey conducted are as under.

14.2.1 Traffic Volume Survey

Traffic volume surveys are conducted to analyze the status of traffic, load on the existing road, traffic congestion area, type of vehicles and traffic movement etc. Hence four data collections points have been identified to gather the traffic volume count. Samples have been collected during the peak hour, both in the morning as well as in the evening and the equivalent Passenger Car Unit (PCU) has been calculated based on conversion Table 14.1. Data collected from the survey are shown in Table 14.2.

Table: 14.1 Traffic Volume Count (Primary Survey Report)

Sr. No.	Point	Median	Carriageway (In Meters)	RoW (As per MDP-2025) (In Meters)	Time 9:30-10:30 am	Time 18:30-19:30
					PCU (Morning)	PCU (Evening)
A	Amer Road (Kanak Ghati to Jama Masjid)	No	8	12*	714	1086
B	Amer Road (Kanak Ghati to Jama Masjid)	Yes		60		
C	Nahargarh Road	No	5	-	342	480
D	NH-248	Yes	60	90	908	1996
E	NH-48	Yes	60	90	3048	2855

Source: Primary Survey

Note: * depicts that these roads are not shown as master Plan Roads but Proposed in Zonal Development Plan

According to the survey, the lowest vehicle count was observed on the road going towards Nahargarh and Jaigarh Fort, which is 342 vehicles in the morning time whereas 480 vehicles during the evening time. The maximum vehicle count is observed on National Highway-48 heading toward Delhi. The maximum vehicle count observed was 3048 vehicles per hour during the morning survey and 2855 vehicles during the evening time. The major reason behind the increase in the vehicle count is due to existing industrial setup. NH-48 intersects the ESZ boundary for a short interval and has the maximum traffic flow as it is the main highway bypassing Jaipur to Ajmer Road and is mostly consisting of passing by traffic and heavy-load vehicles.



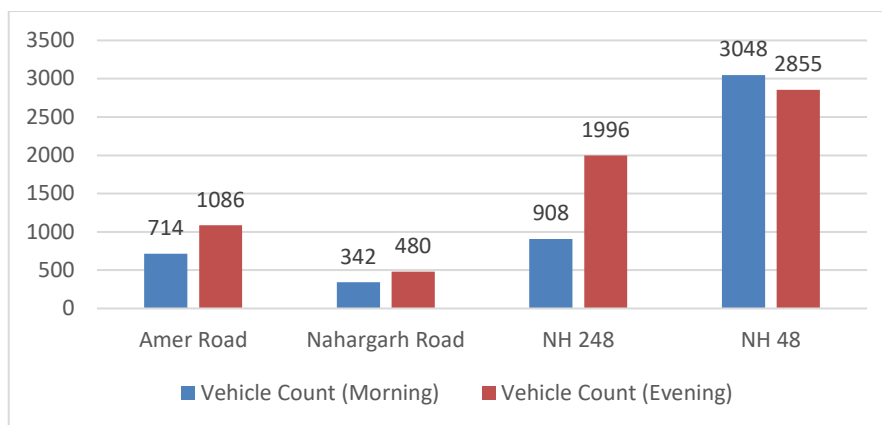


Figure No.: 14.1 Details of Vehicle Count

Table: 14.2 50 PCU Standards

Sr. No.	Vehicle Type	Standard PCU
1	Passenger Car, Tempo, Auto, Jeep, Vans & Agriculture Tractor	1
2	Truck, Bus, Agriculture Tractor- Trailer	3
3	Cycle, Scooter, Motorcycle	0.5
4	Cycle Rikshaw	1.5
5	Hand Drawn Vehicles	4
6	Bullock Cart/ Camel Cart	5
7	Hand Cart	6

Source: URDPFI Guidelines

14.2.2 Parking Characteristics

Adequate and quality parking is very essential for the development of the region. At important tourist sites parking facility is mostly available but in a visual survey, it is observed that the facility is inadequate for peak times. Near the Nahargarh fort, there is paid parking available for tourists which is inadequate for peak times and tourists tend to park in haphazard ways creating problems for the flowing traffic, in a visual survey it is observed that the parking is mostly on the unpaved surface.

Parking is one of the major and important aspects of both transportation and tourism. It is always a major challenge as well. The existing parking facility at various locations under ESZ is shown in Table 14.3.

Table: 14.3 List of Monuments with Parking Facilities at various Tourist Sites

Sr. No.	Name of Tourist Places	Approx. Area (Sq. M)	ECU Existing Capacity	No. of Parking Sites
1	Amer Fort	13894	556	3
2	Bhubaneshwar Mahadev temple	963	39	1
3	Charan Mandir	518	21	0*
4	Gaitor Ki chhatriyan	1137	45	1



5	Haathi Gaon	3693	148	1
6	Harshnath Bhairavji	908	36	0*
7	Jaigarh Fort	5478	219	3
8	Jal Mahal	685	27	1
9	Old Govind dev Ji Temple	2890	116	1
10	Mansa Mata	270	11	0*
11	Nahargarh Biological Park	9906	396	1
12	Nahargarh Fort	7249	290	2
13	Papad Wale Hanumanji	3342	134	0*
14	Sagar Lake, Amer	788	32	1
15	Shiv Temple, Amer	357	14	0*

Note * represents the site not having a designated parking facility.

Map Showing the Parking Areas at different tourist locations is attached as Annexure- 16.

As per the table shown above the availability of parking facilities is the least in Mansa Mata Temple which is an unplanned parking facility and unorganized. Whereas the maximum parking space available is 13894 sq.mt. which is appropriate for approximately 550 cars. There are 3 parking facilities available at Amer Palace. The existing scenario of the parking facility is found to be inappropriate as during peak season the tourist footfall is very high in the sites like Amer Fort, Jaigarh Fort, Nahargarh Fort and Jal Mahal.

14.3 Existing Road Network & their Characteristics within ESZ and its Periphery

Nahargarh ESZ is well connected by NH-248 in the East and NH-48 in the West. These highways act as major connectivity links from various areas of the city to ESZ.

There are four types of road surfaces in the region namely, bitumen roads, cemented roads, stone paved roads and unpaved roads. Bitumen road is mostly on the major access roads and highways. The connectivity of rural regions of ESZ is mostly ensured by cemented roads. Walkways within the forest areas are made up of stone paved roads, unpaved roads/ WBM roads exist in the ESZ region.

14.3.1 Existing Road Characteristics

Road characteristics of important roads under ESZ, Nahargarh are explained as under:

Table: 14.4 Characteristics of Roads under ESZ Area

Characteristics	Jaipur Delhi Road	Jaipur Delhi Road	Amer Road	Nahargarh Road	Nahargarh Biological Park Road
Road Type	NH-48	NH-248	Arterial Road	Arterial Road	Link Road
Road Material	BT Road	BT Road	BT Road	BT Road	Cemented
Median	Available	Available	NA	NA	NA
Carriage Way (In Mt.)	60	60	8	4	5
ROW (In Mt.)	75	75	12	6	8
Road Condition	Good	Good	Average	Good	Good
Footpath	Yes	Yes	Partial	No	No

14.4 Public Transport

14.4.1 Availability of Public Transport

It plays a very important role in providing accessibility as well as in reducing traffic and pollution. According to Jaipur City Transport Service Ltd. the study area is served by 'Jaipur Bus' although it does not cover the complete area. There are three bus route which serves the ESZ area details of which is as under:

14.4.2 Existing Route

'AC-5, 3B & AC-1' are three bus routes available to commute to Nahargarh Eco-Sensitive Zone. The area covered by these busses and their route details are as under:

- **Route-1 (Bus No. AC-5)- Agrawal Farm to Amer**

This route starts at Agrawal Farm covering various parts of the city and ends at Amer. The route covered by this bus is:

Agrawal Farm - Gujar Ki Thadi - Gopalpura - Tonk Phatak - Ajmeri Gate - Badi Choupad - Ramgarh Mod - Amer.

- **Route-2 (Bus No. AC-1)- Sanganer to Kukas**

This route starts at Sanganer and ends at Kukas, which is the last stop covered by the Jaipur bus under ESZ Nahargarh. Areas covered under this route are:

Sanganer - Durgapura - Tonkphatak - Ajmeri Gate - Badi Choupad - Ramgarh Mod - Amer - Kukas.

- **Route-3 (Bus No. 3B)- Pannadhay Circle to Kunda**

This route starts at Pannadhay Circle and ends at Kunda, areas covered under this route are:

Shyopur - Sanganer Police Station -Durgapura - Durgapura - Tonkphatak - Rambagh - Ajmeri Gate - Sanganeri Gate - Badi Choupad - Ramgarh Mod - Jal Mahal - Amer - Kunda



Route Map showing all three available routes to access ESZ, Nahargarh area is shown below:

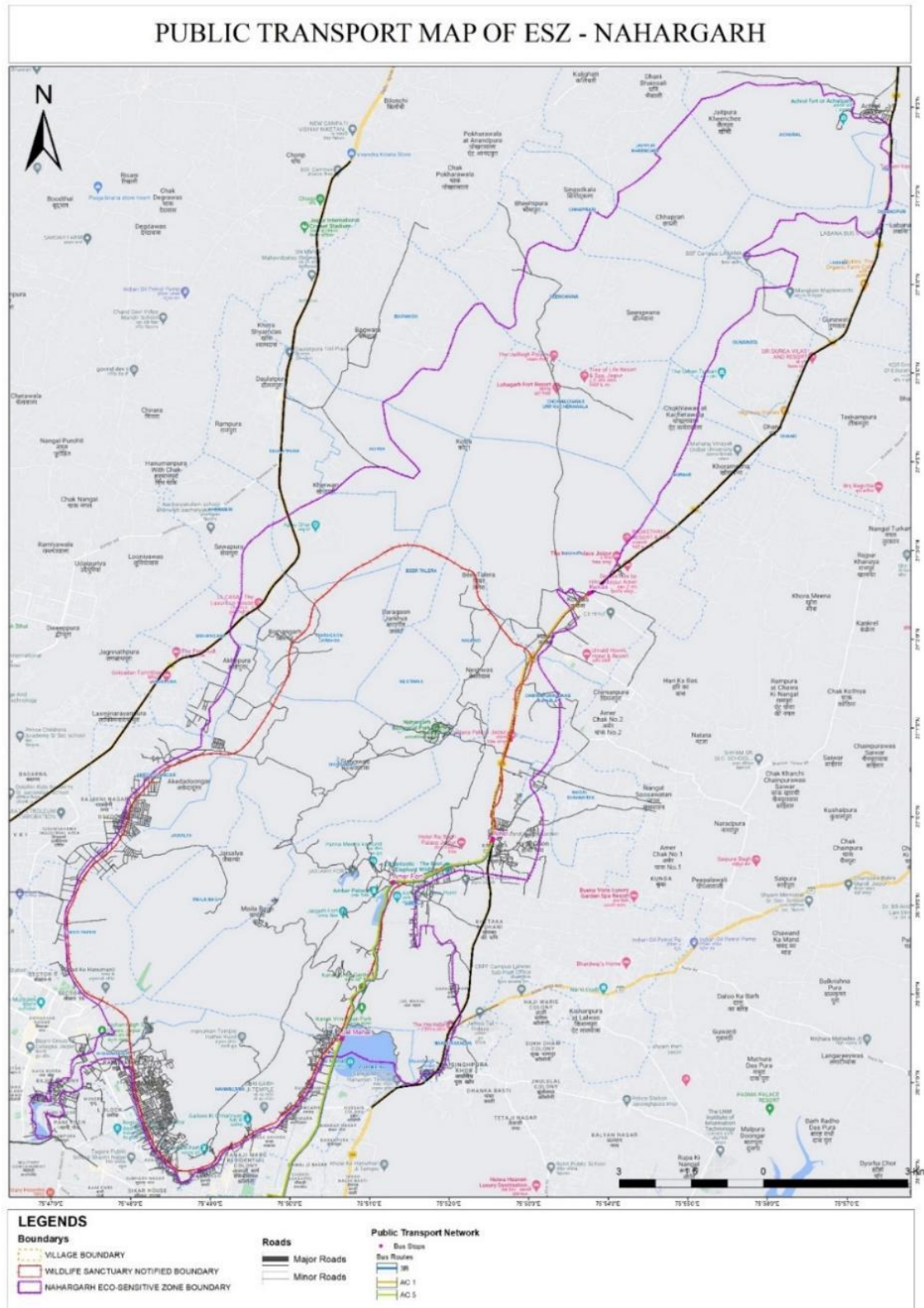


Figure No.: 14.2 Availability of Public Transport

As explained above and shown the existing route of the bus, it is observed that the last area covered by the 'Jaipur City Bus' is Kukas. It is also observed that the majority of the areas under ESZ, Nahargarh are still not directly connected by city bus service, one will need to take either their vehicle or hire a taxi to commute to these tourist sites except Amer Fort and nearby sites. The major constraint of the non-availability of public transport to these areas is that these sites are situated on hilltops hence it is not possible to include these sites in the route of the city bus. Also, a few historical and naturally important sites are partially connected through bus service. These sites are Nahargarh Biological Park, Hathi Gaon, Sagar Lake and Sun Temple etc. Other rural areas under ESZ are not reached by the public transport facility. However, private operators are operating in the region to fill the gap which is of poor quality. Within ESZ there is no public transport facility available for tourists and visitors need to make their arrangements to visit internal ESZ regions.

14.5 Traffic Characteristics

Traffic characteristics are one of the most important studies to improve the traffic-related facility of any area. It includes the study of the type of user as well as vehicle type. Vehicular characteristics are one of the important components to address traffic characteristics. It includes the study of various parameters affecting the traffic such as vehicle type (public/ private), vehicle capacity, the turning radius, speed of the vehicle, street illumination etc. According to existing situational analysis and characteristics of areas under ESZ, it is divided into 5 zones. Zone-1 is identified as an industrial area and has the major traffic of heavy vehicles such as trucks, tempo and other goods supplying vehicles. Zone-2 is the area carrying the residential population (Abadi Areas like Kukas, Old Amer City, Nahargarh Foothills Area etc.), where the movement of traffic is moderate. Zone-3 is majorly Wildlife Sanctuary Area, whereas Zone-4 refers to Forest Areas within the ESZ boundary. Zone-5 is the rural area of Nahargarh ESZ.



TRAFFIC CHARACTERISTICS MAP OF NAHARGARH ESZ

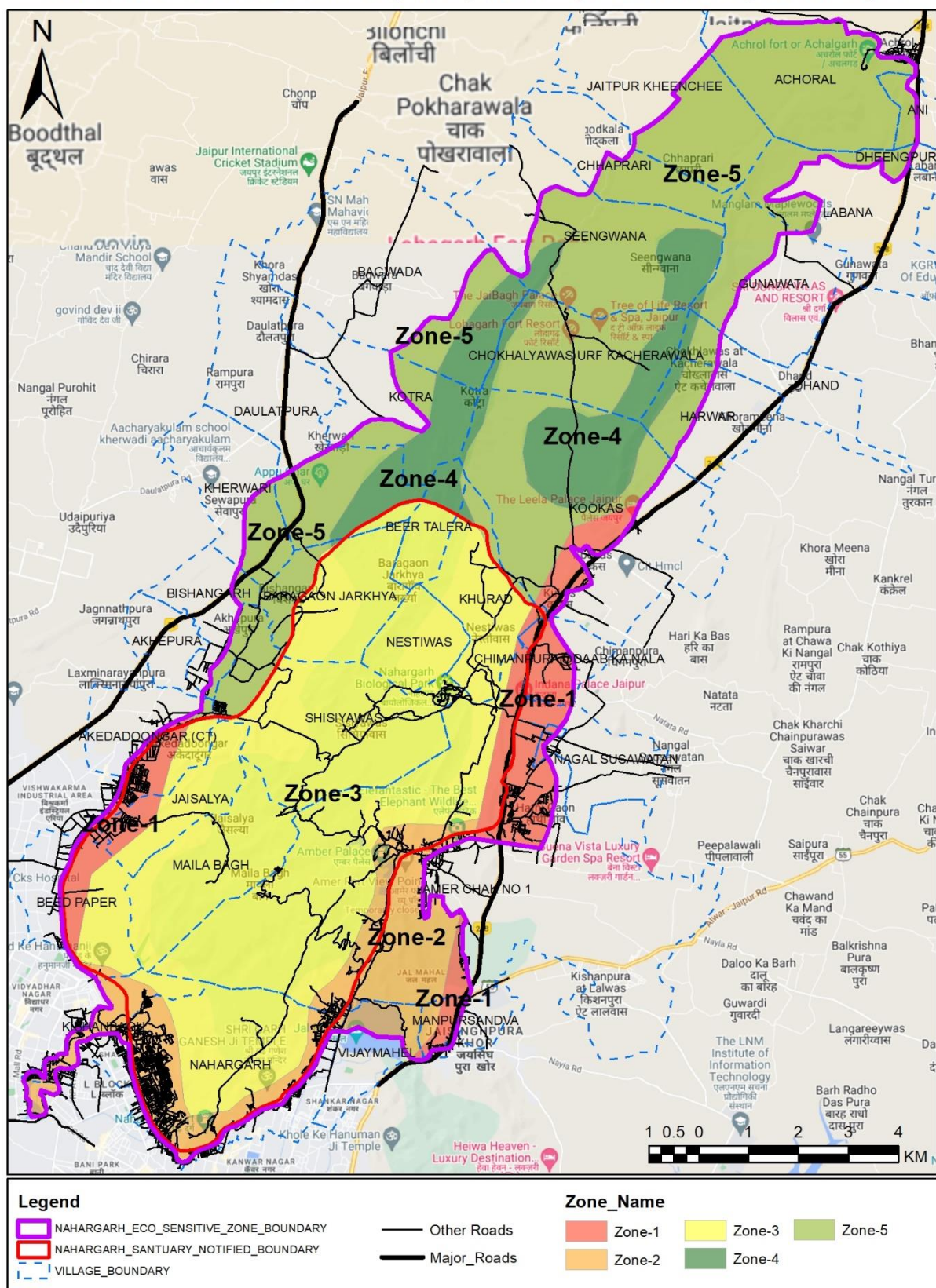


Figure 14-3 Traffic Characteristics Map of Nahargarh ESZ

14.6 Transportation-Related Issues & Problems- Tourism Sites

1. Amer Fort

- Lack of dedicated pedestrian paths on the approach road of the fort.
- Unorganized commercial activity along the road creates road congestion.
- The road width of the main Amer city road connecting NH-48 to internal parts of Amer is only 8 meters and is not adequate, especially during peak season.
- The internal approach road connecting Amer Fort is barely 5-6 meters wide. Similarly, the exit road from Amer Fort is also congested. At present these two roads are one-way traffic roads.

2. Jaigarh Fort

- Single lane approach road having carriageway of only 5 meters
- Lack of public transport facility to approach the fort.
- Non-availability of street lights.

3. Nahargarh Fort

- Lack of public transport facility to approach the fort.
- The lack of sufficient parking space creates problems during peak season.
- Hilly terrain having only 5 meters the carriageway is risky for visitors.
- Absence of a streetlight on the approach road.

4. Bhuteshwar Mahadev Temple

- The approach road is unpaved and is in very bad condition.
- Unorganized parking.
- Lack of signages.
- Non-availability of street light.

5. Old Govind Dev Ji Temple

- Unorganized parking facility.
- The condition of the approach road is average and creates problems during the rainy season.

6. Sagar Lake

- Lack of maintenance of existing infrastructure such as parking and streetlight.
- Lack of public transport facility to approach the site.
- Condition of approach road.

7. Panna Meena Kund



- Lack of parking facilities creates an issue as tourist tends to park on the road.
- The lack of public transport creates a problem to approach the site.
- Due to the old area, the roads are narrow and create a narrow junction.

14.7 Overall Traffic & Transportation Issues within ESZ

- Lack of dedicated pedestrian path, especially near the important tourism sites.
- Lack of parking spaces.
- Congestion on roads due to unplanned parking spaces, unorganized commercial activities.
- Narrow roads in the special areas.
- Lack of public transport facilities in remote areas/villages.
- Condition of roads creates problem in tourism.
- Single lane road in hilly terrain roads creates problem in approach to Nahargarh & Jaigarh fort.
- Absence of street light
- Absence of non-motorized transport facility within ESZ area.
- Lack of signages.
- Unorganized & narrow road junctions.
- Lack of maintenance of existing transport infrastructure.

14.8 Accidents Prone Areas and Defective Road Junctions

Total of 7 accident prone areas are identified, which can be seen in the map below. The description of these accident-prone areas (APA) is as under:

APA-1 is located on National Highway-248 where Amer Road intersects the National Highway, this area is considered an accident-prone area because the road does not have any signal and also the national highway does not have any dedicated pedestrian crossing which is also an issue at this point.

APA-2 is also located on NH-248 itself, this point is the junction of NH-248 & Alwar Jaipur Road which is also called 'Ramgarh Mod'. Traffic monitoring is missing and also the traffic signals are not functional. Being on national highway it is very important to have better traffic management. Hence this area is identified as accident-prone area.



APA-3 is the Junction point of Old Amer Road and Ramgarh Road Junction, this area has heavy flow of buses and hence passenger traffic. The traffic is of mix category. This junction lacks proper management of traffic, especially the buses & auto rickshaws, encroachment by the street vendors also create issue in traffic movement.

APA-4-7 is located at the Amer-Nahargarh-Jaigarh Fort Road. The main reason for the identification of these points is as under:

1. Narrow width of road.
2. Improper road geometrics.
3. Absence of street lights.
4. Absence of safety rails along this hilly road.
5. Absence of signal at the entry point of the road.



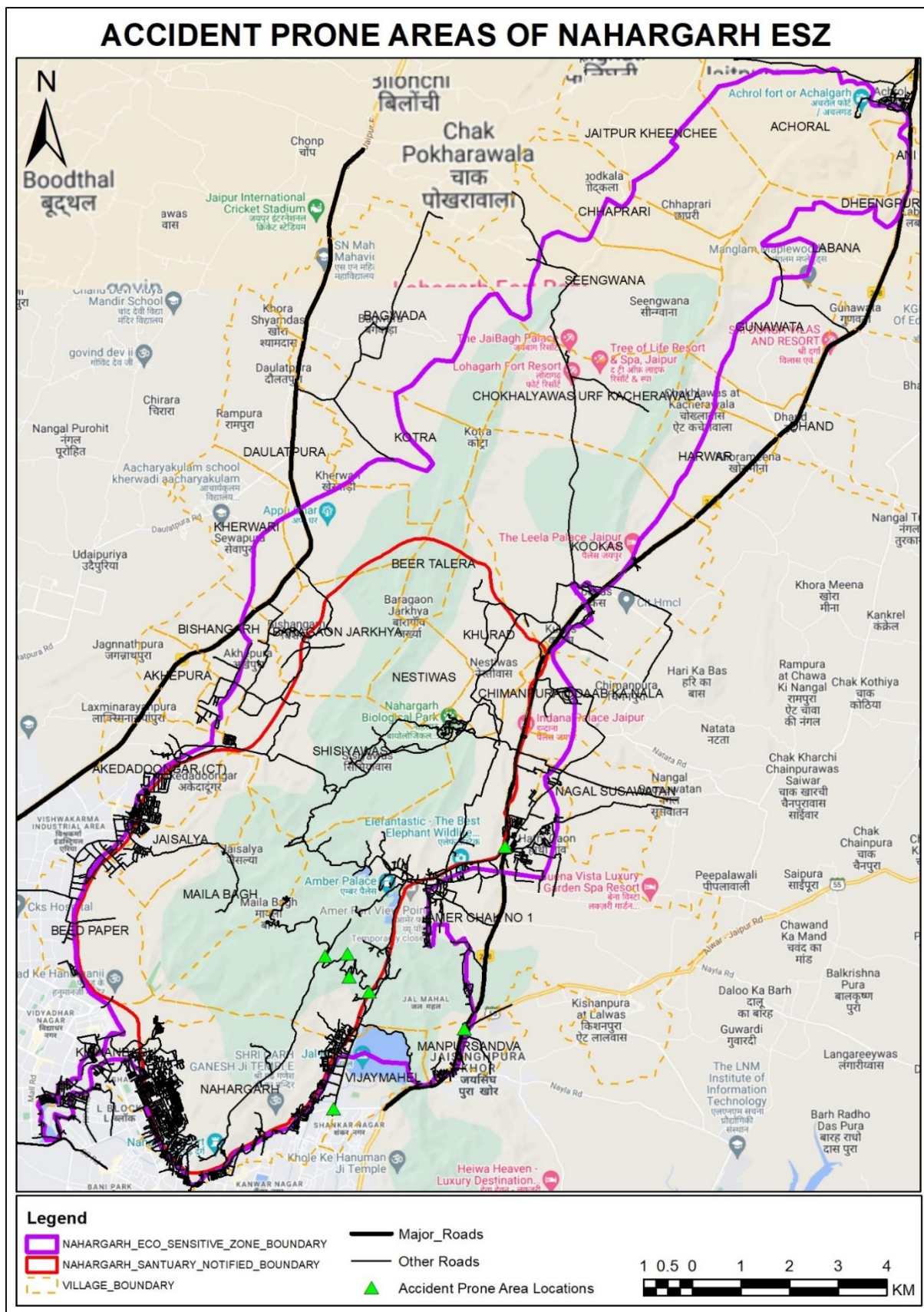


Figure No.: 14.4 Accident Prone Areas of ESZ

15. TOURISM PROPOSALS OF ESZ

15.1 Tourism Strategy

Eco-tourism has emerged as one of the prospective sectors of industry. The future economic development will be greatly influenced by the economic opportunities arising out of tourism growth. The Tourism Development Strategy takes into consideration the economic, political, administrative and environmental aspects of the region that create either opportunities or constraints for the development of tourism and defines the macro-level policy.

The Tourism Development Strategy emphasizes on:

- Harnessing the tourism potential of the region through planned, growth-oriented and sustainable development of the Regional Circuits.
- Developing tourism to ensure the overall development of the region.

The proposed tourism development strategy is based on the following key activities:

- **Focus on quality tourism than mere numbers, especially in eco-sensitive regions:**

Although Rajasthan receives a high number of visitors relative to India, quality tourism should be enhanced with a variety of considerations, like better stay facilities, better connectivity, preservation of heritage values, historical relevance, eco-cultural sensitivity, etc.

- **Holistic & Unified Tourism Policy & incentives:**

Rather than conforming to a single method, tourism development should be given special consideration.

- **A Priority Road map that will focus on creating:**

- Critical infrastructure development- particularly connectivity & accommodation key to tourism development.
- Conducive environment & safety of tourist.
- Community involvement in sustainable tourism.
- Capacity building to be taken up as first priority- as there are severe capacity building needs
- Holistic and Unified Policy with incentives



15.2 Proposals and Recommendations - Important Tourist Sites of Eco-Sensitive Zone (Other than WLS)

15.2.1 Hathigaon

A cloakroom should be provided at the site that can provide a secure storage facility for visitors to deposit their personal belongings, such as bags, backpacks, umbrellas, and other items, while they explore the site.

15.2.2 Jal Mahal

A facility for drinking water is to be provided in the areas outside of the Jal Mahal along with the road stretch.

Tourist information centre to be provided at the site.

15.2.3 Achrol Fort

The issue states non-availability of reception at the site. Hence, a reception centre is to be provided in the fort that can serve as the initial point of contact for visitors and plays a crucial role in providing information, facilitating entry, and ensuring a positive experience for tourists.

A cloakroom should be provided at the site that can provide a secure storage facility for visitors to deposit their personal belongings, such as bags, backpacks, umbrellas, and other items, while they explore the site.

15.2.4 Chamunda Temple Achrol

Provision of boundary wall at the premises of the temple on hill top is needed for protection.

Access road needs widening to achieve easy movement and accessibility.

A facility for drinking water is to be provided in the area.

15.2.5 Old Govind Devji Temple

The issue states non-availability of reception at the site. Hence, a reception centre is to be provided in the fort that can serve as the initial point of contact for visitors and plays a crucial role in providing information, facilitating entry, and ensuring a positive experience for tourists.



A cloakroom should be provided at the site that can provide a secure storage facility for visitors to deposit their personal belongings, such as bags, backpacks, umbrellas, and other items, while they explore the site.

15.3 Development Proposals

15.3.1 Infrastructure/facility area development

Survey has been conducted to find out the gaps in infrastructure and facilities available at various tourist sites. Hence the necessary infrastructure from a tourism point of view is planned to facilitate the visitors. Facility Area includes provision of toilets, drinking water facility, rain shelters, sitting arrangements, food kiosk (temporary nature).

Tourism Infrastructure recommendations including: accommodation requirements, restaurants, tourism information requirements, enroute amenities, tour and travel services (need to 'influence the influencers'), tourist guides and site services, shopping facilities, ATM, internet facilities, tourism police, etc.

15.3.2 Tourism Support Programs/ Plans

Several tourism support programs are planned, as these will really decide transformation of local community, local economy and ensure tourism growth in a sustainable manner. In the case of North-East, for tourism to be a key economic driver, these plans are essential to be implemented over long term.

15.3.3 Community Participation Programs

Community participation is key to sustainability of tourism projects. Projects are planned with community in center and as partners of the development. This in addition to making the projects economically contributing will also make it sustainable and reduce possible cultural conflicts. An effective way to improve the economy is to enable communities to improve the quality of life through social mobilization of the people. The key plan components include.

Handicrafts promotion and product development catering to tourists. One of the major support programs proposed, Rajasthan is famous for its cultural diversity, historic value, handicraft and handloom attractions, however product reorientation, development, trainings and marketing is required for economic benefit.



15.3.4 Private Sector Participation Strategy & Facilitation

It is very important to have more private sector participation with various schemes launched by Government of Rajasthan for example, “Adopt a Heritage” can help to develop the heritage site & promote tourism.

15.3.5 Formulation of Tourist Circuit

Tourist Circuit is one of the most important parts of the Master Plan. The key criteria for Circuit formulation are:

1. Key tourism attraction's themes
2. Safety and security
3. Duration of stay
4. Accessibility from entry points
5. Connectivity between destinations & time taken.
6. Travel cost
7. Entry points & nodes

Major factor to propose these tourism circuits are to introduce maximum important places to the tourists and also to conserve these historically significant places.

15.4 Management and Governance Issues

15.4.1 Grazing in Nahargarh ESZ

Very large number of cattle, sheep, goat and camel graze inside the protected area. The months from July to October are the most problematic since most of the cattle of nearby villages move into the protected areas. The grazing by cattle has adversely affected the regeneration. The quality of grasses has also deteriorated in the area.

Grazing has following adverse impacts in the ESZ area;

- i) The area is being degraded.
- ii) There is every possibility of spread of communicable diseases in the wild animals.
- iii) Illegal wood cutting/lopping goes on with the illegal grazing.



15.4.2 Felling of Trees

The maximum consumption of wood occurs during winters. Nearby villages are heavily depended on forest for firewood. Because of this severe pressure on the forest, falling in the vicinity of Jaipur city has become prone to illegal felling. Availability of firewood is low in the area and the people are resorting to pollarding and cutting of live green trees.

15.4.3 Soil Conservation, Water Harvesting and Combating with Drought Conditions

Situation along with soil erosion becomes very challenging for the local ecosystem of ESZ. Combining with soil erosion, there is less of water conservation in the Sanctuary. The main water reservoir Kukas and Sagar Dam has been suffering from drought for the last few years due to scanty rainfall. During the summers, rainfall is negligible and evaporation is high, and result the low-lying areas turned to dry areas easily, that results frequent droughts which make the water situation still worse. Shortage of water, results in the wild animals to come out of the Sanctuary area in search of water and are killed in accidents or poached by the villagers.

15.5 Proposals for Eco Tourism

15.5.1 Criteria for Selection of Eco-Tourism Areas within ESZ boundary

1. The potential Eco-Tourism Sites should be chosen from the villages within Eco-Sensitive Zone Area but outside the Wildlife Sanctuary Boundary.
2. All such villages should have a good natural setting & proper accessibility.
3. After analyzing the above Chokhalyawas & Singwana Villages are found suitable for development of Eco-Tourism Activities. In these villages farm-based eco-tourism & model village-based tourism can be developed. However eco-tourism proposals can also be framed in ESZ area other than these two villages.

15.5.2 Type of Eco Tourism Proposed for Nahargarh ESZ

Eco-tourism is a powerful tool for the conservation of forests, biodiversity/wildlife, and scenic landscapes by creating sustainable alternative livelihoods for forest-



dependent communities and by generating conservation awareness among mass and the decision-makers. However, the villagers within Nahargarh Eco-Sensitive Zone do not depend on forest produce for their livelihood. Therefore, use of forest resources or forest produce is not relevant in this case and hence agro-based eco-tourism has been considered as most suitable. Agro-based eco-tourism is also good for upliftment of village community. The agro-based tourism can have following aspects:

1. Participatory organic farming for tourists.
2. Various participatory activities like community plantation, water harvesting etc.
3. Use of new technology like hydroponics, aeroponics for sustaining exotic plants and can also be used as a demonstrative tool for farmers as well as visiting tourist.
4. Demonstration of traditional village life/culture for tourists.

Apart from the above, Jaipur has been selected as **City of Crafts and Folk Arts** by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Therefore, traditional arts and crafts can be developed to showcase and market them for tourism. In view of this, development of villagers can be supported by proposing a skill development center whereas tourists can experience the rich art with having a hands-on experience of the practices.

5. Meeting local farmers - Allows tourists to experience the authentic rural lifestyle. It offers an opportunity to learn about the local farming practices, traditional cultivation techniques, and the significance of agriculture in the local culture and provides valuable educational insights into agricultural processes, sustainable farming methods, and the importance of biodiversity in farming systems.
6. Tasting a variety of fresh foods and produce - Involves farm-to-table experiences where visitors can taste locally grown and freshly harvested foods. By tasting and purchasing local foods, tourists directly support local farmers and the local economy.
7. Learning about rural art - Incorporating rural art into agro-based eco-tourism diversifies the tourism offerings of a destination, attracting visitors with a specific interest in arts and cultural experiences. This diversification contributes to the sustainable development of tourism by reducing dependency on a single tourism segment, extending tourist stays, and enhancing the overall visitor experience.
8. Participatory dairy-based activities for tourists like milking cattle - Provides visitors with a hands-on learning experience about dairy farming. They get to understand the



process of milk production, learn about the care and management of dairy animals, and gain insights into the daily routines of dairy farmers.



16. TOURISM PROPOSALS IN WLS

Eco-tourism has become one of the most promising business areas. The economic prospects brought about by the expansion of tourism will have a significant impact on future economic development. The macro-level policy is defined by the tourist development strategy, which takes into account the region's economic, political, administrative, and environmental factors that either present possibilities for or barriers to the growth of tourism. There are restrictions on development of various facilities at tourist sites within WLS. As the area is within WLS, hence the regulations related to wildlife regulations and forest regulations will apply. Therefore, any development if felt necessary by the monitoring committee or tourism department then prior approval from forest and wildlife department would be necessary.

The study of various tourism sites was done which are of are given in Annexure 17.

16.1 Development Proposals

For the development of tourism sector in wildlife sanctuary area different developmental proposals are of suggestive nature, which may be scrutinized by the monitoring committee of Tourism Department and Forest Department before taking any action. The Proposals are as under:

16.1.1 Infrastructure/Facility Area Development

A survey has been done to determine the infrastructural and facility deficiencies at various tourist destinations. The provision of restrooms, drinking water facilities, rain shelters, seating arrangements, toilet facilities and temporary food kiosks are all included in the facility area.

16.1.2 Tourism Development Programs/Plans

Numerous tourism assistance programmes are being developed since they will significantly influence how the local community and economy are transformed, as well as whether tourism will flourish sustainably. These plans must be carried out over the long term if tourism is to be a major economic engine in the North-East.



16.1.3 Programmes for Community Involvement

For tourist initiatives to be sustainable, community involvement is essential. Projects are planned with the community at their core and as development partners. This will make the projects more sustainable and less likely to cause cultural tensions while also making them economically beneficial. One of the main support programmes put forth is the promotion of handicrafts and the development of products geared towards tourists.

16.1.4 Private Sector Participation Strategy & Facilitation

It is very important to have more private sector participation with various schemes launched by Government of Rajasthan for example, “Adopt a Heritage” can help to develop the heritage site and promote tourism.

16.1.5 Formulation of Tourist Circuit in WLS

Tourist Circuit is one of the most important parts of the Master Plan. Two types of tourism circuits have been planned according to their characteristics and significance. Those two types of circuit area explained below:

16.1.5.1 Historical Circuit

This circuit focuses on historically important sites of the region. Components of Historical Circuit are as under

I. Site Selection

Selection of site under this circuit is on the basis of historical importance of the sites and their significance from ancient history of Amer dynasty of Jaipur. Sites selected under this circuit are:

1. Amer Fort
2. Jaigarh Fort
3. Nahargarh Fort
4. Getor ki Chatriyan
5. Sagar Lake
6. Panna Meena Kund



II. Connectivity & Route mapping

The selected sites are already well connected with road network. The existing route is planned in such a way that the travel time can be reduced and the accessibility is enhanced with basic infrastructure facilities like travel modes and facility. Map showing the site locations and connectivity is attached at Annexure- 14.

III. Duration of Stay

As per the preliminary survey and site analysis it was noticed that sites like Amer Fort, Nahargarh Fort, Jaigarh Fort takes more than one hour each to visit due to the large areas and internal activities of these sites, whereas the site Gaitor ki Chatriyan, Panna Meena Kund and Sagar Lake requires one hour each.

IV. Entry Point & Route Details

Entry point or starting point of the circuit is planned from Parshuram Dwara near Jal Mahal which is shown in the map below. The route starts from Amer Fort there after covering Panna Meena Kund moving forward to Sagar Lake then returning back towards Jaigarh Fort to Nahargarh Fort then moving to Gaitor ki Chatriyan after that visit to Jal Mahal and the route ends at the starting point i.e. Parshuram Dwara itself.

An additional route from Nahargarh to Gaitor ki Chatriya is also taken on consideration which is optional and can be taken by the tourist willing to track down from the pedestrian route.

V. Facility and Infrastructure Development

Facilities like parking, tourist information center, toilet facility, drinking water, tourist shed with sitting arrangement, rain shelter, small commercial space for refreshments must be provided at starting points to facilitate tourists. Dedicated mini bus facility to cater the tourist can also be proposed to accommodate more tourists to these sites and enhance the ease of travel to the tourist.

VI. Travel Cost

Travel cost for the tourist visiting these sites may be worked out separately with respect to the facility and infrastructure cost required to develop the circuit and its functionality.



16.1.5.2 Nature Based & Wildlife Circuit

As the name itself explains about these circuits, the main focus of this circuit is to provide the experience of lush green forest, wild life and natural experience to the tourist. Components of Nature & Wildlife Circuit are:

I. Site Selection

Selection of site under this circuit is on the basis of the natural significance and environment friendly. Sites selected under this circuit are:

1. Nahargarh Biological Park
2. Odhi Bhawan
3. Ramsagar Lake
4. Prabhat Puri ka Khola

II. Connectivity & Route mapping

The selected sites are already well connected with road network. The existing route is planned in two modes i.e. Motorized & Pedestrian Circuit. The Motorized Circuit will connect areas such as Gaitor Ki Chatriyan, Prabhat Puri ka Khola, and Nahargarh Biological Park, whereas the pedestrian circuit will connect the sites such as Odhi Bhawan, Ram Sagar Lake and the internal part of Nahargarh Biological Park. Map showing the nature & wildlife based sites locations and connectivity attached at Annexure-14.

III. Duration of Stay

As per the preliminary survey and site analysis it was noticed that sites like Nahargarh Biological Park, takes more than one hour each to visit due to the coverage areas and internal activities of these sites where as the site Ramsagar Lake, Ramsagar Lake, Prabhat Puri ka Khola requires less than an hour each.

IV. Entry Point & Route Details

Entry point or starting point of the circuit is planned from Parshuram Dwara near Jal Mahal which is shown in the map below. The route starts from Nahargarh Biological Park there after covering Odhi Bhawan moving forward to Ramsagar Lake then returning back towards Kukas to Hathigaon then moving to Kanak Ghati after that visit to Prabhat Puri ka Khola and the route ends at the starting point i.e. Parshuram Dwara.

V. Facility and Infrastructure Development



Facilities like parking, tourist information center, toilet facility, drinking water, tourist shed with sitting arrangement, rain shelter, small commercial space for refreshments must be provided at starting points to facilitate tourists. Dedicated mini bus facility to cater the tourist can also be proposed to accommodate more tourists to these sites and enhance the ease of travel to the tourist.

VI. Travel Cost

Travel cost for the tourist visiting these sites may be worked out separately with respect to the facility and infrastructure cost required to develop the circuit and its functionality.

16.2 Connectivity to Other Important Tourist Places

There are many other tourist places having historic, religious importance & having scenic beauty. These places are not connected by motorable roads and hence the pathways have been proposed to be strengthening as a part of tourism proposals. These sites are namely: 1. Amba Mata temple, 2. Kadmeshwar Mahadev Temple, 3. Kuntalgarh Fort, 4. Jatti Ke Balaji, 5. Bhuteshwarnath Mahadev Temple etc. These sites and their connectivity can be depicted from Tourism Map of Nahargarh ESZ attached at Annexure-14.

16.3 Nature Interpretation Center for Nahargarh Sanctuary

Nahargarh Sanctuary is fortunate to have richness of natural beauty, flora and fauna accompanied with places of religious historical and archeological importance. The rich cultural and historical heritage of the area attracts people from other states of India as well as from abroad.

So far, tourism in Nahargarh Sanctuary has been attracting domestic tourists in few numbers but looking to the enchanting beauty and splendor of the picturesque forest wealth present in the surrounding sanctuaries and reserve forest areas, there is high scope of opening new avenues of tourism related to nature and forests.

Nature interpretation center facilities are not developed for the sanctuary. There should be a proper center available near the entrance of the sanctuary. The center should have exhibits displayed. The following suggestions may be considered when the decision is taken for development of interpretation center:



i) Exhibits

- a) The interpretation center will have one or more exhibit galleries developed on the basis of specific communication objective. The following exhibit themes are considered.
- b) A relief map of the area showing various zones, population density of major species and tour tracks for visitors.
- c) Exhibits depicting major flora & fauna of the sanctuary
- d) Exhibits showing mammals, birds, reptiles, amphibians, which form the faunal population of the Sanctuary.
- e) Exhibits showing invertebrate animals such as insects, mollusks, etc., found in the Sanctuary.
- f) Exhibits of common trees, plants flowers and other interesting botanical features peculiar to the sanctuary.
- g) Exhibits on food chain and food webs in the Sanctuary.
- h) Exhibits on animal and plant adaptation relevant to the species of the Sanctuary.
- i) Exhibits on endangered species protected in the Sanctuary.
- j) Exhibits dealing with conservation issues such as damage to wildlife, forests, and ecosystems caused by man, the importance of conserving the fragile ecosystems, etc.
- k) Exhibits dealing with the objectives, activities, and conservation action plans of the Sanctuary.
- l) Exhibits providing tips on do's and don'ts while visiting the Sanctuary.
- m) The display material should be in hindi and english.
- n) The interpretation center should be situated near the boundary of the Sanctuary.
- o) The Interpretation Centre should not only have display boards but models of wild animals and birds should be displayed.
- p) Pamphlets giving details of sanctuary area, animals, and birds should be distributed.
- q) The dedicated staff should be posted to help visitor's curiosity.

The above exhibits at the Interpretation Centre, properly designed and installed with relevant information contents, would serve as a useful pre-visit orientation for visitors. It will not only give them an idea and insight on what to look for and what to assimilate while in the Sanctuary, but also include an interest in identifying at least some of the species that come across. The Interpretation Centre would also serve as a post-visit



resource center, where visitors could come back and check and verify their observations (on identification of species, for example) with the exhibits.

ii) Resource Material for Conservation Education

- a) A guide map showing the various areas of the sanctuary to be visited, major flora and fauna to be observed at each location and the trails recommended.
- b) Interpretative materials in the form of orientation maps, information leaflets, checklists of species, picture post cards, etc., which will go a long way in assisting the visitors to take maximum advantage of their visit.

16.4 Challenges to Tourism & Wildlife

The good health of wilder areas is the key for success of nature-based eco-tourism. Today, the Nahargarh Eco-tourism faces great threat from increasing population and its ever-growing needs. Invasion of exotic species *Prosopis Juliflora* is a major challenge in the Nahargarh Sanctuary.

16.5 Management and Governance Issues

16.5.1 Poaching Issues

Poaching is not a serious problem in Nahargarh Wildlife Sanctuary but the most of the area of the Sanctuary is open for grazing. Hence, there is no restriction on the movement and entry of the people or strangers into the Sanctuary. The population of Leopards is also considerable.

i) Bawariyas, and other Nomadic Hunters

In district of Jaipur, there are tribal families constantly engrossed in wildlife poaching activities. Bawariyas is one such community, which is poaching wildlife. The villagers (agriculturists) employ these Bawariya tribes for crop protection whenever the wild animals come out from forest and raid the crops, and the Bawariyas use firearms and shoot them to scare them.

The socio-economic condition of these tribes is very poor. They are landless and have no permanent dwellings hence rehabilitation of these tribes is very essential. Sometime these poaching Bawariyas go with the gangs for poaching the animals inside the protected areas. These tribes can be easily influenced by money. In anthropological terminology, the Bawariya tribes are still in the hunting-gathering stage of development. Logically the strategy for development is to get them to settled economy i.e. agriculture.



16.5.2 Soil Conservation, Water Harvesting, and Combating with Drought Conditions

It is observed that, the terrain of sanctuary is hilly and undulating, and depth of the soil is very shallow. Underneath the shallow soil, the earth is stony hence; the growth of vegetation is sparse, and such condition is unfavorable for allowing retention of water in the sub soil layer.

16.5.3 Felling of Trees

I. Fuel Wood and Fodder Problem

The Nahargarh Sanctuary is surrounded by a large human and cattle population, which lives in villages and townships located within 5 km radius from the Sanctuary boundary. Problem increases manifold during lean period due to drought condition and non- availability of fuel.

II. Infrastructure and communication

In Nahargarh Sanctuary Area of Reserved Forest (RF) is about 50sq.km. The terrain is hilly, undulating and well wooded. There are villages in and around the sanctuary. There is a lot of movement of people in this region. To provide adequate protection to the wildlife and manage the protected area, proper infrastructure and communication network is of paramount importance and provision needs to be made for this.

16.6 Site wise Tourism Proposal

16.6.1 Nahargarh Biological Park (NBP)

- Recommendation for Natural Interpretation Center for the tourist.
- Cloackroom within reception center can be provided.

16.6.2 Kadamb Kund, Brahampuri

- A facility for public transportation is needed.
- Signage on the main road is to be installed.
- Provision for seating benches, toilet block, drinking water facility and shed should be installed.



16.6.3 Ram Sagar Lake

- Improvement in unpaved access paths is needed.
- The facility of public transport is needed.
- Signage on the main road is to be installed.
- Provision for seating furniture is to be placed at appropriate places and improvement of existing furniture is needed.
- A biodegradable toilet facility with a temporary eco-friendly structure is constructed.
- A facility for drinking water is needed.
- Installation of public light is needed.

16.6.4 Prabhat Puri Ka Khola

Proposals and Recommendations

- The facility of public transport is needed.
- Signage on the main road is to be installed.
- Provision for seating furniture is to be placed at appropriate places.
- A biodegradable toilet facility with a temporary eco-friendly structure is to be constructed.
- A facility for drinking water is needed.
- Installation of public light is needed.

16.6.5 Amer Fort, Amer

- A cloakroom should be provided near the reception premises in the fort.

16.6.6 Nahargarh Fort

- A cloakroom should be provided near the fort's reception premises or the tourist information centre.
- Public transport by bus is to be provided.
- Wayside facilities with temporary and eco-friendly structures can be provided to facilitate the daily needs of the visitors, which will also employ the informal sector.
- The wayside shops with temporary/eco-friendly structures can be provided by the JMC/competent authority, issuing them a specific certificate of vending.



- A museum which will have a glimpse of Rajput traditions/attire/female costumes, significant glimpses of treaties between kings, statues of major rulers of Jaipur and their armours, sword, guns, canons and other contemporary weapons etc. may be kept at this museum. This museum will cherish the heritage of the city.

16.6.7 Jaigarh Fort

- A cloakroom should be provided near the fort's reception premises or the tourist information centre.

16.6.8 Sagar Lake, Amer

- There should be a reception centre for the peak season visits.
- There should be a cloakroom for the peak season visits.
- Public bus transport is to be made available.
- Drinking water facility is to be provided.
- Bio-degradable type of public toilet is to be provided.
- CCTV cameras are to be installed.
- Provisions of the security guards is to be ensured for the peak season visits.

16.6.9 Panna Meena Kund

- There should be a reception centre for the peak season visits.
- There should be a cloakroom for the peak season visits.

16.6.10 Gator Ki Chatriyan

- The facility of bus public transport is to be provided.
- Signages should be installed along with the main roads.
- There should be a cloakroom near or within the reception center.

16.6.11 Odhi Bawan

- Facility for public transport is to be made available.
- The quality of the approach road is to be improved.
- Street furniture is to be kept in appropriate places.
- The facility of drinking water is to be made available.
- A facility for a public toilet is to be made available.
- Public light is to be made available.



- A facility for waste management is to be made available.
- CCTV cameras for safety concerns are to be installed.
- A sufficient number of signages are to be placed along with the main road and at the site.

16.6.12 Kuntalgarh Fort or Old Amer Fort

- Facility for public transport is to be made available.
- The quality of the approach road is to be improved.
- Street furniture is to be kept in appropriate places.
- The renovation of internal parts and their accessibility is to be improved.
- The facility of drinking water is to be made available.
- A facility for a public toilet is to be made available.
- Public light is to be made available.
- A facility for waste management is to be made available.
- CCTV cameras for safety concerns are to be installed.
- A sufficient number of signages are to be placed along with the main road and at the site.

16.6.13 Jatti Ke Balaji Temple

- Facility for public transport is to be made available.
- Street furniture is to be kept in appropriate places.
- A facility for a public light, public toilet and waste management is to be made available.
- CCTV cameras for safety concerns and a sufficient number of signages are to be placed along with the main road and at the site.
- Rain shelter of eco-friendly structure is to be made which can give shelter from blazing sun rains in peak summer times also.

16.6.14 Garh Ganesh Temple,

- The public transport facility is to make available.
- A reception centre is to be made.
- Provision of a cloakroom at the reception centre is to be made.



- A sufficient number of signages are to be installed for necessary facility. indications at the site and an approach sign on the main road for the site.
- Provision for adequate seating benches (furniture) is to be placed at appropriate locations.

16.6.15 Bhuteshwar Mahadev Temple

- Improvement in the unpaved access road is needed.
- The public transport facility is to make available.
- A signage is to be installed on the main road for the site.
- Provision for adequate seating benches (furniture) is to be placed.
- A public light in the temple is to be installed.
- Biodegradable toilet facility is to be provided with temporary structures.
- Dustbins should to be placed at appropriate locations.

16.6.16 Jama Masjid

- Installation of CCTV camera is needed.
- Provision of adequate seating furniture is required.

16.6.17 Amba Mata Temple

- Improvement in the unpaved trekking path is needed.
- Public transport facility up to base ie. Sagar Lake parking to be made available.
- Approach and accessibility to various internal parts is to be improved.
- Drinking water facility is needed.
- A signage is to be installed on the main road.
- Provision for adequate seating benches (furniture) is to be placed.
- Biodegradable toilet facility is to be provided with temporary structures.
- Dustbins are to be placed for solid waste collection at Sagar Lake and at the Temple.
- Installation of street lights.
- CCTV cameras are needed for the security purposes.
- A rain shelter having temporary nature(eco-friendly) may be built.

17. TRANSPORT PROPOSAL WITHIN ESZ, NAHARGARH

Improvement of transportation infrastructure plays a crucial role in various aspects of societal and economic development. Here are some key reasons highlighting the importance of improving transportation infrastructure:

Improving transportation infrastructure for tourism in Nahargarh ESZ (Ecologically Sensitive Zone) should be approached with careful consideration to minimize environmental impacts while enhancing accessibility for visitors. Here are some potential strategies for improving transportation infrastructure in Nahargarh ESZ:

It is crucial to strike a balance between improving transportation infrastructure for tourism and preserving the ecological integrity of the Nahargarh ESZ. The implementation of sustainable transportation practices and careful planning will ensure that visitors can access and enjoy the ESZ while minimizing their impact on the environment.

17.1 Suggestions for Improvement of Circulation within ESZ Area

After analyzing the existing scenario, it is observed that the road approaching the Amer Fort is already very congested.

1. Approach/ Internal/ Link Roads of Village Chokhalyawas-Seengwana-Chhaprari:

Roads having RoW of 12 meters and 18 meters have been proposed to ensure future connectivity. These roads are important as revenue villages Seengwana and Chokhalyawas have been identified as potential eco-tourism sites.

2. Internal/ Link Roads of Village Kukas:

Roads having RoW of 12 meters and 18 meters have been proposed to ensure future connectivity. The Internal Areas of village Kukas are easily approachable from NH-248 and hence have the potential to the development of resorts.

17.2 Improvement of Road Junctions

Roads and junctions play a very important role in avoiding road accidents and road congestion. Hence improvement of road junctions is required. The images below show the problematic junctions and possible accidental prone areas:



- Amer Road to Nahargarh Fort Road Junction.
- Installation of road signals.
- Development of junction with proper road geometrics and traffic island.
- Speed breaker should be installed.
- Keeping in view tourist traffic and passenger safety, detailed junction design needs to be done separately by the concerned authority.
- Providing dedicated turning lanes and widening the existing junction in order to facilitate smooth vehicular flow.
- A rickshaw stand is present in the existing junction, it needs to be properly delineated and given dedicated space to improve vehicular flow.
- From the entry point of Old Amer (near Jama Masjid) to Kunda NH-Bypass Junction.
- Installation of a road divider.
- Maintenance of manholes and increase the width of the carriageway (7.5 meter on either side of the divider and width of divider 1 meter).
- Providing properly dedicated pedestrian crossing with installation of speed calming measures.



Observation: Need to improve road geometry to give proper turning radius.



Figure 17-1 Amer Road to Nahargarh Fort Road Junction



17.3 Suggestions for Parking Facility

Parking facilities at various tourist places are shown in Table 17.1 and the area available for parking is inadequate, especially during peak season. Hence the parking

facility needs to be proposed at individual site level to avoid congestion, smooth the flow of traffic and ease tourist movement.

Table: 17.1 Proposals for Designated Parking Spaces at various tourist sites

Sr. No.	Name of Tourist Places	Approx. Area (Sq. M)	ECU Existing Capacity Non-Designated	No. of Designated Parking Sites
1	Papad Wale Hanumanji	3342	134	0*

* Places falling in Wildlife Sanctuary Area

Parking facilities to be equipped with charging stations: - As per the National Electric Mobility Mission Plan 2020 integrating public places with different levels of charging infrastructure like fast charging or rapid charging stations can help boost the use of electric vehicles and help reduce the carbon emission and adverse environmental impacts. As per the policy it also sets down strategies and methods for appropriate pricing and procurement of the charging stations and points with an incentivized supply rate from the DISCOM providers. Integrating this in the ESZ zone will help reduce vehicular pollution by promoting use the of e-vehicles.

17.4 Proposed Road of ZDP- 2025 under Nahargarh ESZ

The Figure 17.1 shows the road Proposal as per MDP /ZDP Jaipur, 2025.



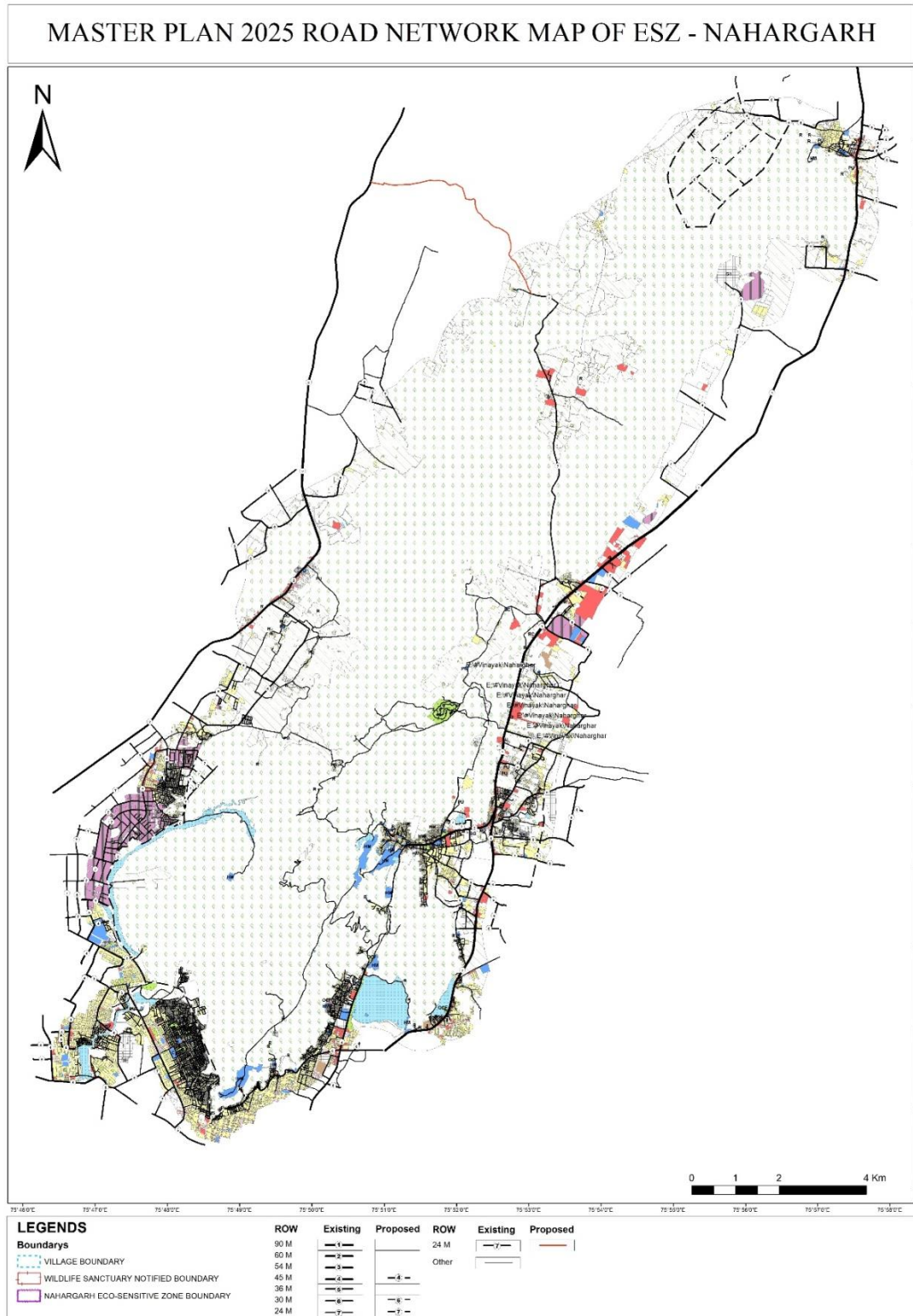


Figure No.: 17.1 Proposed Road of ZDP- 2025 under Nahargarh ESZ

17.5 Public Transport Recommendations

As explained above there are 3 different bus routes functioning in Nahargarh Eco-Sensitive Zone. The routes and the stoppage are proper from the point of accessibility and no changes are required. However, the frequency of the buses may be increased to facilitate more tourists/ visitors as well as the local commuters.

17.5.1 Shuttle Service

It is recommended that shuttle services may be proposed to connect various tourist sites of Nahargarh ESZ. This shuttle service may start from Parshuram Dwara on Amer Road, and this will carry tourists to important tourist sites. This will result in reduced demand for parking at tourist sites and decrease congestion during peak season, and help promote public transportation which will reduce vehicular pollution.

17.6 NMT/E-Vehicles Eco-Friendly Zone

It is very important to conserve and protect the environment to protect natural habitat. At present vehicle fumes create a lot of pollution in this area. Hence the proposal of promoting the use of non-motorized vehicles or e-vehicles in the Nahargarh Eco-Sensitive Area should be initiated at the earliest. The following measures/ steps may be taken for the successful functioning of the use of non-motorized vehicles as well as the use of e-vehicles:

Installing bicycle sharing and hiring sites may be set up (with normal bikes and e-bikes) to commute/travel within the vicinity of Amer Area for visiting tourist sites. This will result in the reduction of emissions and dependency on parking spaces at the tourist sites.

18. TRANSPORT PROPOSAL WITHIN WLS

After analyzing the existing scenario, it is observed that the road approaching the Amer Fort is already very congested.

18.1 Circulation and Connectivity Proposals

18.1.1 Approach Road- Jaipur City to Amer

The approach road to Amer from Kanak Ghati is properly developed in the best possible manner. However, in the future, this approach road will need widening for the increasing traffic. The present carriage width is approximately 8 meters and the RoW as per ZDP is 12 meters, which is recommended to be increased to 18 meters and the carriageway width should be increased to 14 meters. However, these suggestions need to be examined by the Forest Department before implementation.

18.1.2 Approach the Road to Nahargarh Biological Park

The present approach road of Nahargarh Biological Park has a RoW of 12 meters which should be increased to 18 meters. However, these suggestions need to be examined by the Forest Department before implementation.

18.1.3 Approach Road from Amer Road to Nahargarh Fort & Jaigarh Fort

This road will need widening of the carriageway from 5 meters to 8 meters and the proposed RoW will be 12 meters as it is planned on a hill and does not have much scope for an increase in the width of the road. However, these suggestions need to be examined by the Forest Department before implementation.

Internal approach road from Amer Old City to Amer Fort.

This Road has been encroached at a number of places (as compared to the satellite images of the year 2000 and year 2022). The encroachment varies from 2-3 meters. However, the Local Body must identify it on the ground and remove the encroachment.

I. Improvement of Existing Pathways

Various pathways leading to important tourist sites need strengthening and maintenance. These are shown in the Transportation Network Map of Nahargarh ESZ which is enclosed as Annexure-15.



18.2 Parking Facility-Related Suggestions

In some places, there is no designated parking area and hence parking areas need to be developed at the place below. However, the places which are part of Wildlife Sanctuary can be developed only after getting permission. So, the suggestions given as far as wildlife sanctuary areas are concerned are of suggestive nature and it may be considered by the monitoring committee after getting the approval from forest department.

Table: 18.1 Proposals for Designated Parking Spaces at various tourist sites

Sr. No.	Name of Tourist Places	Approx. Area (Sq. M)	ECU Existing Capacity Non-Designated	No. of Designated Parking Sites
1	Harshnath Bhairavji	908	36	0*
2	Mansa Mata	270	11	0*
3	Charan Mandir	518	21	0*
5	Shiv Temple, Amer	357	14	0*

* Places falling in Wildlife Sanctuary Area

The future development of Nahargarh ESZ is dependent on the improvement of connectivity and tourism facilities in the WLS area. The majority of the important tourism sites in Nahargarh ESZ are already connected with road network and provision of public transport would enhance connectivity and easy access to the sites.



19. PRESERVATION AND CONSERVATION OF HERITAGE BUILDINGS

19.1 Measure to be Taken for Maintenance and Conservation of Heritage Buildings

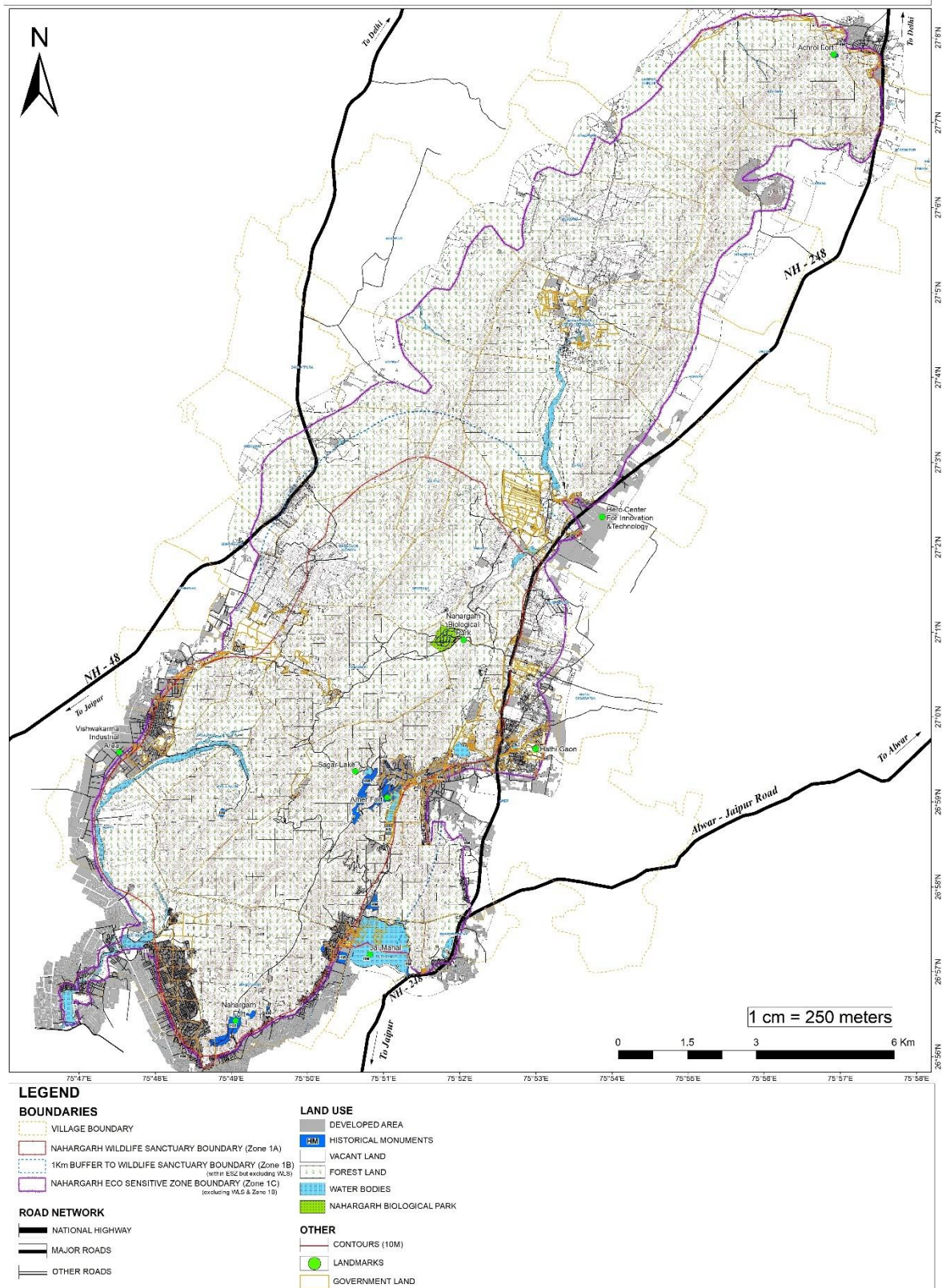
Recommendation for preventive measures to be taken in consideration for conservation of heritage buildings representing the cultural significant of the ancient times is as under:

- Updation and reconciliation of protected monuments list to avoid ambiguity with regard to the number of protected monuments.
- Provision for inspection of each monument time to time by the competent authority.
- Identification of the current state of each inspected monument and identify the requirements of conservation on the basis of detailed inspection note and photographic evidence collected during such inspection on a regular basis.
- There should be regular monitoring of existing encroachment cases as well as making sure to avoid further encroachment.
- Encroachment by State Government agencies or other Government of India agencies should be sorted out in a time bound manner.
- There should be a security plan for each monument, considering its location, area, structure, footfall and other vulnerabilities. This exercise should be performed in house by the ASI and State Archaeology Department to ensure coverage of ground level realities.



ANNEXURE- 1 BASE MAP

BASE MAP OF NAHARGARH ECO-SENSITIVE ZONE



ANNEXURE- 2 HOUSEHOLD SURVEY FORMAT

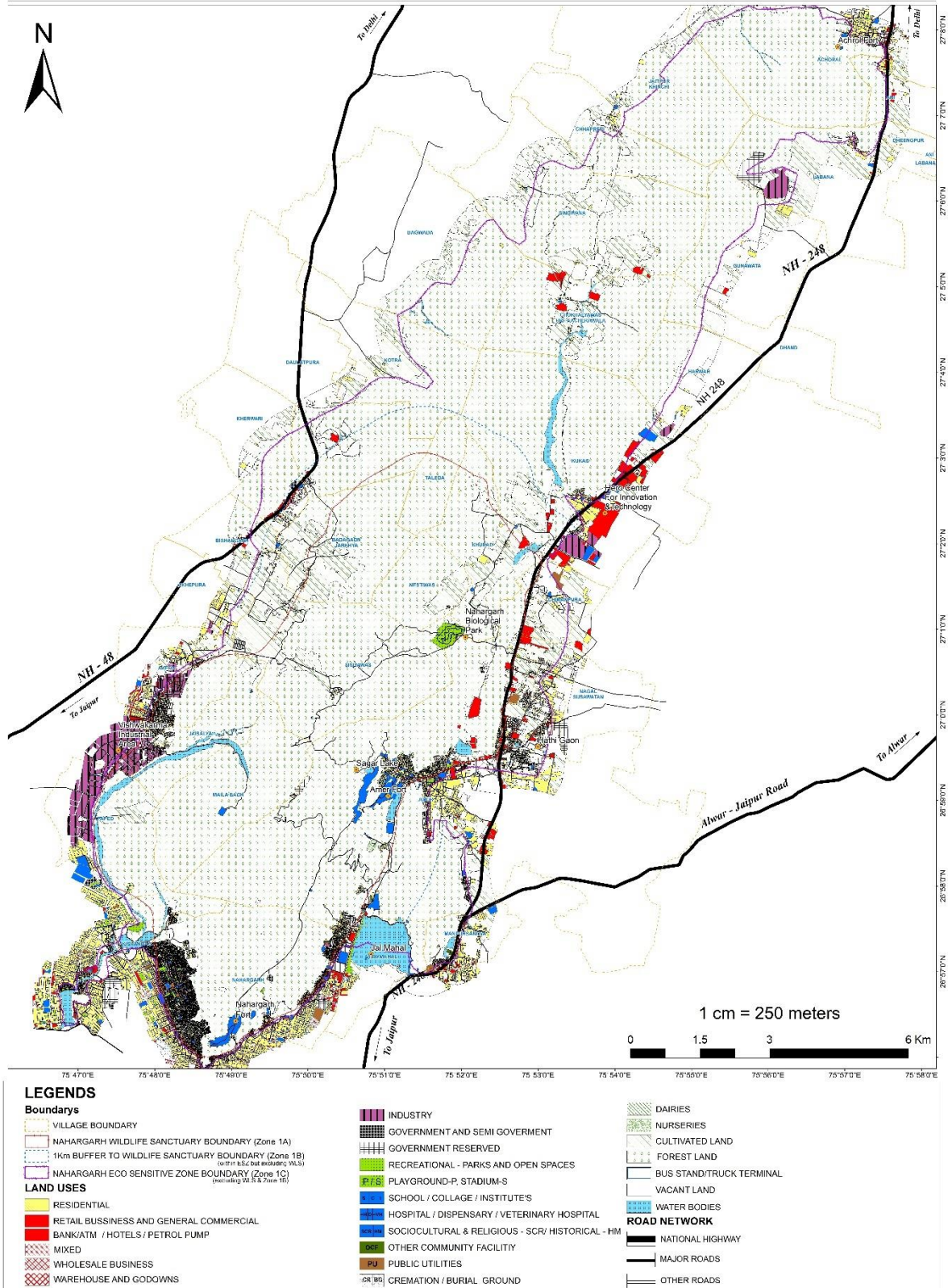
S. No.	Particulars	Details
1	Quality of Approach Road	
2	Public Transport	
3	Wayside Amenities	
4	Signage (from main road)	

S. No.	Particulars	Details
1	TOURIST PROFILING	
(i)	Category of Tourists (domestic /international / local /pilgrim etc.)	
(ii)	Footfall of Tourist (Annual/ Monthly/ Peak Season)	
	Duration of Stay	
2	TOURIST RELATED PHYSICAL & SOCIAL INFRASTRUCTURE (ON-SITE)	
(i)	Physical Infrastructure	
(a)	Approach & Accessibility (to various internal parts, if any)	
(b)	Tourist Information Centre	
(c)	Reception Centre	
(d)	Accommodation (both Public & Private Sector)	
(e)		
i	Street Furniture	
ii	Drinking Water	
iii	Public Toilets	
iv	Public Light	
v	Clock Room	
vi	Rain Shelters	
vii	Telecommunications	
(f)	Commercial activities (shops/commercial space /cafes/ restaurants/ craft bazaars etc.)	
(g)	Waste Management (Solid & Liquid)	
(h)	Safety – CCTVs	
(i)	Signage	
3	SOCIAL INFRASTRUCTURE	
(i)	Safety & Security (Tourism Police)	
(ii)	Medical facilities	
4	STATUS OF TOURISM PRODUCT (IF ANY)	
	Ropeway	
	Sound & Light show	
	Museums	
5	Any ongoing/ proposed infrastructure activity at site level	



ANNEXURE- 3 EXISTING LANDUSE MAP 2022

EXISTING LAND USE OF NAHARGARH ECO-SENSITIVE ZONE



ANNEXURE-4 COMPARATIVE ANALYSIS OF EXISTING AND PROPOSED LANDUSE IN NAHARGARH ESZ

Distribution and Difference in Existing and Proposed Landuse in Nahargarh ESZ

Landuse	Proposed Area (Ha) as per MDP 2025	Existing Area-2022 (Ha)	Differences
Residential	874.95	214.54	660.41
Special Area	0.76	0.76	0
Commercial	22.43	61.89	-39.46
Mixed	1.55	7.69	-6.14
Industrial	20.83	39.54	-18.71
Government	0	33.64	-33.64
Public and Semi Public	494.78	34.77	460.01
Recreational	119.67	9.59	110.08
Circulation	259.41	246.76	12.65
Total Developable Area	1794.41	648.42	1145.99
Vacant Land	0	427.59	-427.59
Agriculture	0	935.9	-935.9
Water Body	158.16	110.59	47.57
Government Reserved	1.15	1.95	-0.8
Forest +Hills+G1+G2+Ecological Area	5777.49	5606.62	170.87
Total	7731.07	7731.07	0



ANNEXURE - 5 COMPARATIVE ANALYSIS OF EXISTING AND PROPOSED LANDUSE IN ZONE 1B

Landuse	Proposed Area (Ha) as per MDP 2025	Existing Area-2022 (Ha)	Difference
Residential	657.6	128.1	529.5
Special Area	0.76	0.76	0
Commercial	18.15	36.17	-18.02
Mixed	0	5.72	-5.72
Industrial	20.83	15.11	5.72
Government	0	1.39	-1.39
PSP	105.2	25.51	79.69
Recreational	46.06	9.18	36.88
Circulation	102.06	85.4	16.66
Total Developable Area	950.66	306.57	644.09
Vacant Land	0	204.9	-204.9
Agriculture	0	535.1	-535.1
Waterbody	83.11	86.36	-3.25
Government Reserved	1.15	1.19	-0.04
Forest +Hills+G1+G2+Ecological Area	969.7	870.5	99.2
Total	2004.62	2004.62	0



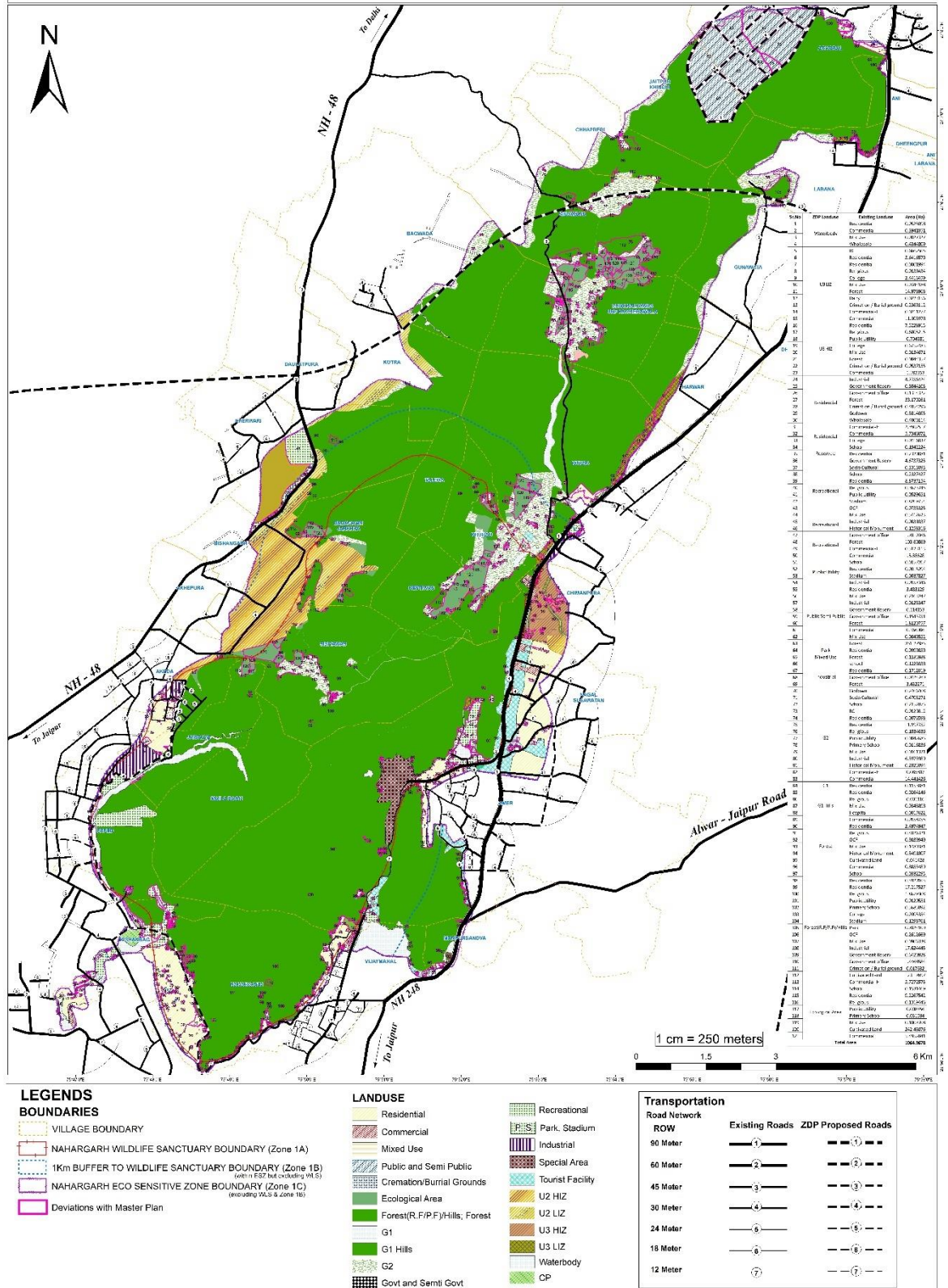
ANNEXURE -6 COMPARATIVE ANALYSIS OF EXISTING AND PROPOSED LANDUSE IN ZONE 1C

Landuse	Proposed Area (Ha) as per MDP 2025	Existing Area-2022 (Ha)	Difference
Residential	217.35	86.44	130.91
Special Area	0	0	0
Commercial	4.28	25.72	-21.44
Mixed	1.55	1.97	-0.42
Industrial	0	24.43	-24.43
Government	0	32.25	-32.25
PSP	389.58	9.26	380.32
Recreational	73.61	0.41	73.2
Circulation	157.35	161.36	-4.01
Total Developable Area	843.75	341.85	501.9
Vacant Land	0	222.69	-222.69
Agriculture	0	400.8	-400.8
Waterbody	75.05	24.23	50.82
Government Reserved		0.76	-0.76
Forest +Hills+G1+G2+Ecological Area	4807.79	4736.12	71.67
Total	5726.45	5726.45	0

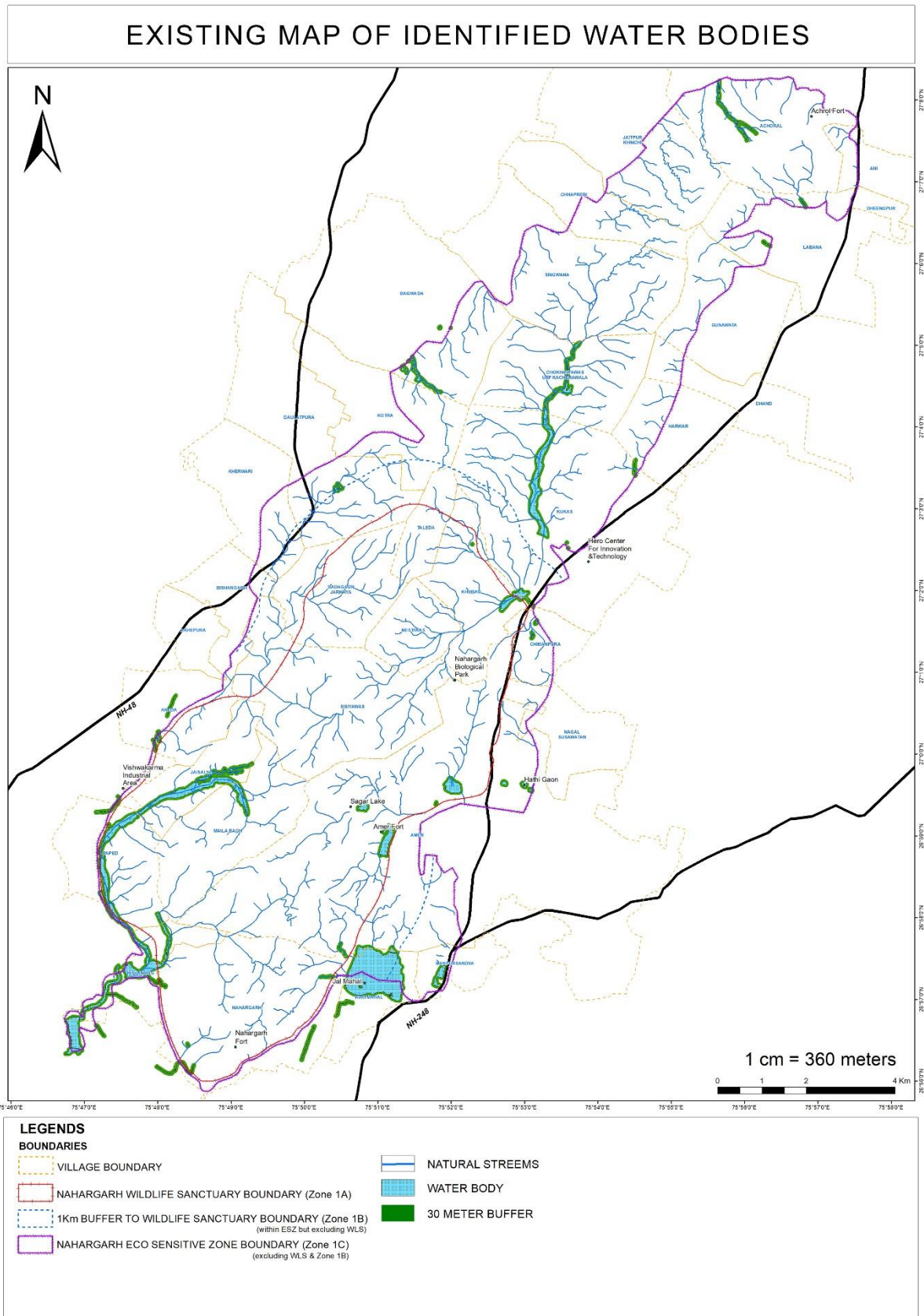


ANNEXURE -7 LANDUSE DEVIATION MAP

DEVIATION OF EXISTING LANDUSE W.R.T. PROPOSED LANDUSE OF ZDP- 2025

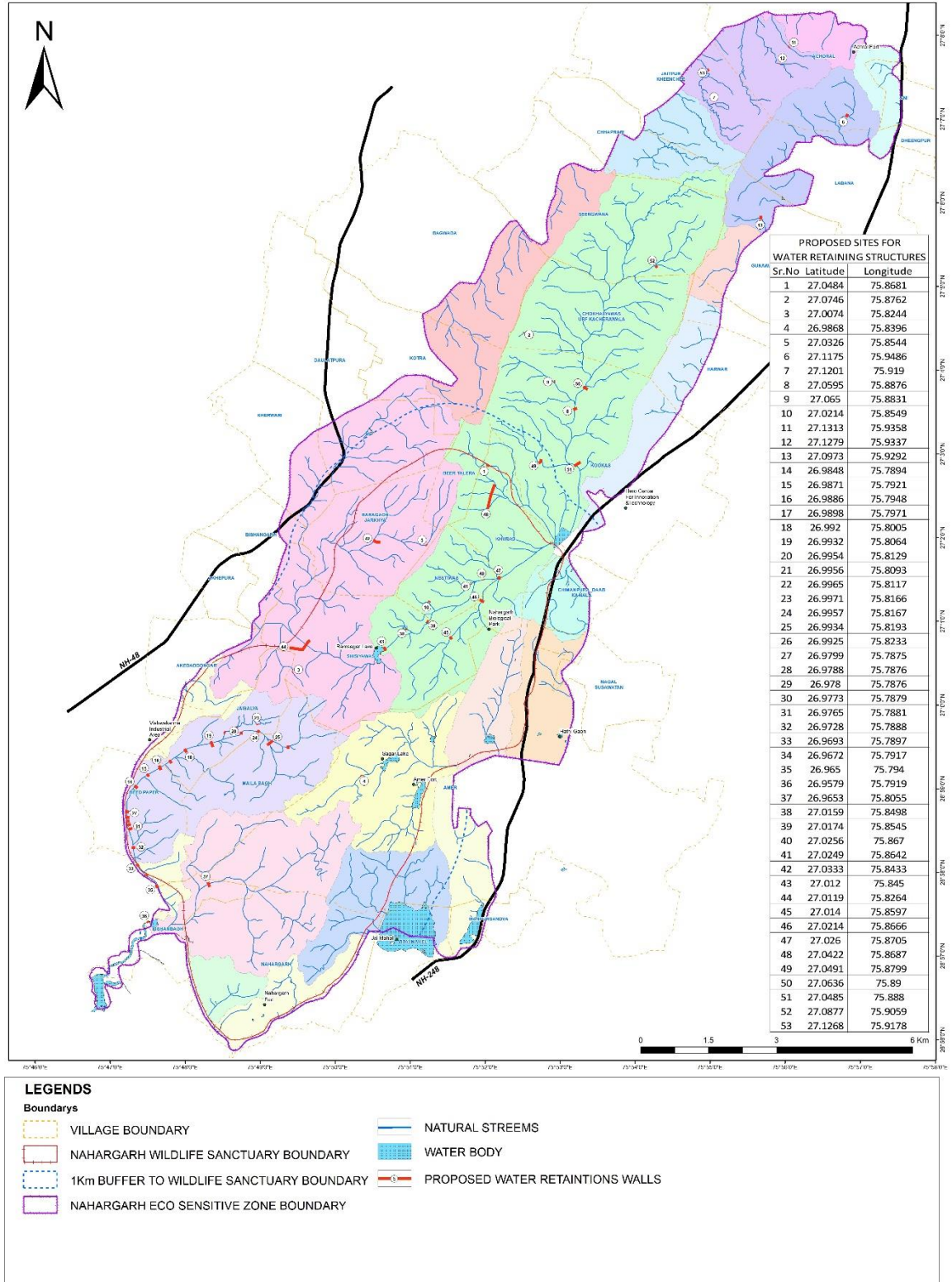


ANNEXURE -8 IDENTIFIED WATER BODIES



ANNEXURE - 9 LOCATION OF THESE PROPOSED EMBANKMENTS

PROPOSED LOCATIONS FOR WATER RETAINING STRUCTURES IN NAHARGARH - ESZ



ANNEXURE -10A LIST OF ACTIVITIES PROHIBITED WITHIN ECO-SENSITIVE ZONE

S. No.	Activity	Description
(1)	(2)	(3)
A. Prohibited Activities		
1.	Commercial mining, stone quarrying and crushing units.	All new and existing mining (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect except for meeting the domestic needs of bona fide residents including digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing and for other activities. The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 4 th August, 2006, and dated 28 th April 2023 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21 st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012.
2.	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.).	New industries and expansion of existing polluting industries in the Eco-Sensitive Zone shall not be permitted: Provided that non-polluting industries shall be allowed within Eco-Sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February 2016, unless otherwise specified in this notification and in addition the non-polluting cottage industries shall be promoted.
3.	Establishment of major hydro-electric project.	Prohibited (except as otherwise provided) as per the applicable laws.
4.	Use or production or processing of any hazardous substances.	Prohibited (except as otherwise provided) as per the applicable laws.
5.	Discharge of untreated effluents in natural water bodies or land area.	Prohibited (except as otherwise provided) as per the applicable laws.
6.	Setting up of new saw mills.	New or expansion of existing saw mills shall not be permitted within the Eco-Sensitive Zone.
7.	Setting up of brick kilns.	Prohibited (except as otherwise provided) as per the applicable laws.
8.	Commercial use of firewood.	Prohibited (except as otherwise provided) as per the applicable laws.
9.	New wood-based industry.	Prohibited (except as otherwise provided) as per the applicable laws.
10.	Fishing.	Prohibited (except as otherwise provided) as per the applicable laws.
11.	Use of plastic carry bags.	Prohibited (except as otherwise provided) as per the applicable laws.



ANNEXURE -10B LIST OF ACTIVITIES TO BE REGULATED WITHIN ECO-SENSITIVE ZONE.

S. No.	Activity	Description
(1)	(2)	(3)
B. Regulated Activities		
12.	Commercial establishment of hotels and resorts.	No new commercial hotels and resorts shall be permitted within one kilometer of the boundary of the protected area or up to the extent of Eco-Sensitive Zone, whichever is nearer, except for small temporary structures for eco- tourism activities: Provided that, beyond one kilometer from the boundary is nearer, all new tourist activities or expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines of the protected area or up to the extent of Eco-Sensitive Zone whichever as applicable.
13.	Construction activities.	(a) New commercial construction of any kind shall not be permitted within one kilometer from the boundary of the protected area or up to extent of the Eco-Sensitive Zone, whichever is nearer: Provided that, local people shall be permitted to undertake construction in their land for their use including the activities mentioned in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents. Provided further that the construction activity related to small scale industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any. Beyond one kilometer it shall be regulated as per the Zonal Master Plan.
14.	Felling of trees.	There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the Competent Authority in the State Government. The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made thereunder.



15.	Commercial extraction of surface and ground water.	Regulated as per the applicable laws.
16.	Erection of electrical and communication towers and laying of cables and other infrastructures.	Regulated under applicable laws (underground cabling may be promoted).
17.	Widening and strengthening of existing roads and construction of new roads.	Taking measures of mitigation as per the applicable laws, rules and regulation and available guidelines.
18.	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.
19.	Introduction of exotic species.	Regulated as per the applicable laws.
20.	Protection of hill slopes and riverbanks.	Regulated as per the applicable laws.
21.	Discharge of treated wastewater or effluents in natural water bodies or land area.	The discharge of treated wastewater or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated wastewater. Otherwise, the discharge of treated wastewater or effluent shall be regulated as per the applicable laws.
22.	Commercial sign boards and hoardings.	Regulated as per the applicable laws.
23.	Small scale non-polluting industries.	Non-polluting industries as per classification of industries issued by the Central Pollution Control Board in February, 2016 and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro- based industry producing products from indigenous materials from the Eco-Sensitive Zone shall be permitted by the competent Authority.
24.	Collection of Forest produce or Non-Timber Forest produce.	Regulated as per the applicable laws.
25.	Solid waste management.	Regulated as per the applicable laws.
26.	Eco-tourism.	Regulated as per the applicable laws.

27.	Bio-Medical Waste Management.	Regulated as per the applicable laws.
28.	Air and vehicular pollution.	Regulated as per the applicable laws.
29.	Drastic Change of Agriculture systems.	Regulated as per the applicable laws.
30.	Fencing of existing premises of hotels and lodges.	Regulated as per the applicable laws.
31.	Infrastructure including civic amenities.	Taking measures of mitigation as per the applicable laws, rules, and regulations available guidelines.
32.	Establishment of large-scale commercial livestock and poultry farms by firms, corporate and companies.	Regulated (except otherwise provided) as per the applicable laws except for meeting local needs.
33.	Undertaking other activities related to tourism like flying over the Eco-Sensitive Zone area by hot air balloon, helicopter, drones, Microlites, etc.	Regulated as per the applicable laws.
34.	Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture, and fisheries.	Permitted as per the applicable laws for use of locals.

ANNEXURE - 10C LIST OF ACTIVITIES TO BE PROMOTED WITHIN ECO-SENSITIVE ZONE.

S. No.	Activity	Description
(1)	(2)	(3)
C. Promoted Activities		
35.	Rain water harvesting.	Shall be actively promoted.
36.	Organic farming.	Shall be actively promoted.
37.	Adoption of green technology for all activities.	Shall be actively promoted.
38.	Cottage industries including village artisans, etc.	Shall be actively promoted.
39.	Use of renewable energy and fuels.	Bio-gas, solar light etc. shall be actively promoted.
40.	Agro-Forestry.	Shall be actively promoted.
41.	Environmental awareness.	Shall be actively promoted.
42.	Skill Development.	Shall be actively promoted.
43.	Restoration of degraded land/ forests/ habitat.	Shall be actively promoted.
44.	Plantation of Horticulture and Herbals.	Shall be actively promoted.
45.	Use of eco-friendly transport.	Shall be actively promoted.



ANNEXURE -11 ECOLOGICAL AREA AS PER MDP JAIPUR 2011

- 1) Nursery& Orchard- Nursery, Orchard, Residential Flat (for watch & ward and maintenance staff)
- 2) Ecological zone -Agriculture, Forest, Water bodies, Regional Park, Botanical Garden, Orchard &Nursery, Zoological Garden /Aquarium,Bird Sanctuary, Specialized Park/Ground, Historical Monument, Memorial, Picnic Hut/Camping Site.Resort, Restaurant, Swimming pool, Playground, Sports Training Institute, Outdoor Stadium, Religious premises, Yoga/Meditation/spiritual/religious discourse Center, Farm house/Environment friendly residence, Fair ground, Vending booth, Police post, Government reserved area, Wireless and transmission, Cremation and burial ground, Rural settlements
- 3) Highway Control Belt-The permission of use premises shall be governed by the rules and guidelines prescribed for this zone.
- 4) Rural Settlement-All uses permitted in residential use zone, Household/cottage/service/other industry, Wholesale trade, weekly market, Government/Semi-government/Local government Offices.
- 5) Rural belt-All use premises permitted in Ecological Zone, Animal Husbandry, Dairy Farm, Poultry, Piggery, Flying club, Research and development center, Fodder market, Weekly market, Junk yard, Perishable/Hazardous/Inflammable goods storage, Motel, Drive-in-cinema, Petrol pump, Police station, Jail, Bus depot, Extraction industry, Railway station/Yard

*Note : MDP 2011 has been considered for the purposes of retaining ecological zone and its provisions due to matter pending in Honorable High Court (Case NO. 1554/2004)



ANNEXURE- 12 PROVISIONS OF MDP 2025

As per the provisions shown in Vol 4 of MDP 2025, Ecological Area may have uses as under-

Ecological Area : The use premises permitted in the Ecological zone of MDP-2011 i.e. Agriculture, Forest, Water Bodies, Regional Park, Botanical Garden, Orchard & Nursery, Zoological Garden/Aquarium, Bird Sanctuary, Specialised Park/Ground, Historical Monument, Memorial, Picnic Hut/ Camping Site, Resort, Restaurant, Swimming Pool, Play Ground, Sports Training Institute, Outdoor Stadium, Religious Premises, Yoga/Meditation/Spiritual/Religious Discourse Centre, Farm House / Environment Friendly residence, Fair Ground, Vending Booth, Police Post, Government Reserved Area, Wireless and Transmission, Cremation and Burial Ground, Rural Settlements and the use premises of G1, G2 use zones. 500mt. Radius area earmarked from existing Abadi of the settlement to accommodate Future growth. (The use of this area is designated as mixed use)

As per Jaipur MDP (2025), the Ecological Zone of Jaipur city is divided into two sub-zones; as follows;

- i) G-1 The green zone is primarily a zone where the aim is to conserve natural features. This zone is strictly reserved. Activities such as circulation, public utilities, recreational, and heritage protection ventures case only are considered in this Zone. In case of conflict of the uses with respect to ownership as per the record of revenue, G2 activities shall apply.
- ii) G-2 It is the area primarily abutting G-1.

*Ecological Zone - This area includes the area which is suitable for agriculture and other eco sensitive purposes. (MDP 2025 Jaipur Region- Vol2)



ANNEXURE- 13 ACTIVITIES PERMITTED IN PREMISES IN G-2 (AS PER MDP 2025)

Table below shows all the activities that are permitted in premises of G-2 as per Jaipur MDP 2025 with minimum area requirement, road width requirement, definitions and permissible uses that provides guidelines for any kind of activity or construction which is to be carried out under Ecological Area.

Activities permitted in premises in G-2 (as per MDP 2025)

S. No.	Activity	Minimum Area required (Hect.)	Road width in m.	Definitions	Use Premises
1	Agriculture	-	-	-	-
2	Bird Sanctuary	-	-	A premise used form of a large park or forest for the preservation and breeding of birds with all related facilities.	Bird Sanctuary, watch & ward residence (upto 30 sq. mt.), Residential flat (for maintenance staff), Retail shop, Restaurant
3	Botanical Garden	-	18mtr. & above	A premise in the form of a garden with plantation for research and exhibition.	-
4	Cremation and Burial ground	-	-	A premoise with facilities of performing last rites of dead bodies by burning.	Burial ground, Cremation groun, Cemetery and electric crematorium, retail shops of wood, flowers and related materials. Watch & ward residence
5	Fair Ground	-	18mtr. & above	A premise having facilities for exhibition, display, other cultural activities for a group of participants, animal market, etc.	Fair Ground, residential flat (for maintenance staff), exhibition center, Restaurant, soft drink & snack stall, police post, fire post, bank extension counter



					facility, post office counter facility.
6	Farmhouse/environment-friendly residence	0.3	18mtr & above	A premise with low height coverage, a low height structure for residential use.	Farm house, environmental-friendly residence, watch & ward residence (up to 30 sq. mt.)
7	Forest	-	-	A thick natural flora, it shall include city forest which may have part natural flora and part manmade flora	Forest
8	Government reserved area	-	-	A premise of government land for reserved use	Government reserved area
9	Historical monument	-	-	Premise having structure or ruins thereof, belonging to an age gone past	Historical monument
10	Memorial	-	-	A premise having a tomb, samadhi or memorial dedicated to an important personality including all related facilities for visitors.	Tomb, Samadhi and other memorial, Watch & ward residence (up to 30 sq. m.), soft drink & snack stall, book and picture card shop.
11	Orchard and nursery	-	-	A premise with facilities for rearing and sale of young plants.	Nursery, Watch & ward residence (up to 30 sq. m.) all structures shall be temporary in nature.
12	Outdoor Stadium	2.0	12mtr. & above	-	Stadium, local government office (maintenance), watch & ward residence (up to 30 sq. m.) residential flat (for maintenance



					staff), retail shop, restaurant
13	Picnic Hut/ Camping Site	1.0	18mtr. & above	A premise for a short duration for recreational or leisure purposes of a family, located within a tourist and/or recreational centre.	Picnic Hut
14	Playground	-	-	A premise used for outdoor games. It may have Landscaping, Parking facilities, Public toilet, etc. on it	Playground
15	Police post	0.5 or may be more	12 mtr. & above	A premise having facilities for a local police post or temporary nature or on smaller scale as compared to a police station	Police post, essential staff housing
16	Regional Park	100 (Diapering of the availability of land)	18 mtr & above	-	-
17	Religious premise	0.5 or may be more	12 mtr & above	A premise dedicated to accommodation and service of God or other objects of religious nature. It may have different nomenclature in different religions like Temple (all faiths), Mosque, Church, Gurudwara, Ashram	(i) Temple, (ii) Mosque, (iii) Church, (iv) Gurudwara, (v) Synagogue, (vi) Ashram, (vii) Bathing Tank, (viii) Dargah and (xi) Charitable dispensary and library.



18	Resort	1.0	18 mtr. & above	-	-
19	Dhaba	0.01	-	A premise used for serving food items on a commercial basis including cooking facilities. It may have covered or open or both sitting arrangements.	Restaurants
20	Rural settlements	As per the requirement of concerned authority	-	A premise for residence village people with related facilities, services, and work centers.	Rural settlement and its planned growth
21	Specialized park/ ground	1.0	12 mtr. & above	A premise having a park or ground for a designated use like public meeting grounds, fun park, wonderland, etc.	Public meeting ground, public address podium, soft drink & snack stall.
22	Sports training institute	0.5	18 mtr & above	A premise having facilities for training and coaching for different indoor and outdoor games including swimming. It shall also include a centre for physical education.	Sports training center, Residential flat (for maintenance staff), Retail shop (Confectionary, grocery & general merchandise), Hostel, Bank, Post office, Canteen, Indoor and Outdoor stadium, swimming pool, playground.
23	Swimming Pool	0.20	9mtr. & above	A premise with related facilities for swimming and spectators' seating which shall vary with size, standard and purpose.	Swimming pool, Watch & ward residence and maintenance staff residence, Restaurant.



24	Vending Booth	3mtr. X 3mtr,	9 mtr. & above	A premise in the form of booth for sale of commodities of daily needs of either through a mechanical installation or otherwise	Vending booth
25	Water bodies	-	-	-	-
26	Wireless and transmission	0.10	12 mtr. & above	-	-
27	Yoga/ Meditation/ Spiritual/ Religious discourse center Social Culture Centre	0.25	18 mtr. & above	A premise having facilities for self-attainment, achieving higher quality of mind and body, spiritual and religious discourse, etc.	Yoga/ Meditation/ Spiritual/ Religious discourse centre Social Culture Centre. The said centres with Watch & ward residence (up to 30 sq. m.), Hostel, guest house, soft drink & stall.
28	Aquarium	-	-	A premise in the form of a garden or park or aquarium with a collection of Animal species and birds for exhibition and study. It shall include all related facilities.	-
29	Agriculture warehousing food storage	0.5	30 mtr.	A premise providing storage of Agriculture produce/ food items in case of village roads building line to be established at 30mtr. from the center of the road.	Godown/ warehousing/ cold storage area, Residential flat (for employees and service personnel, small office 50 sq. m.) with Special permission.

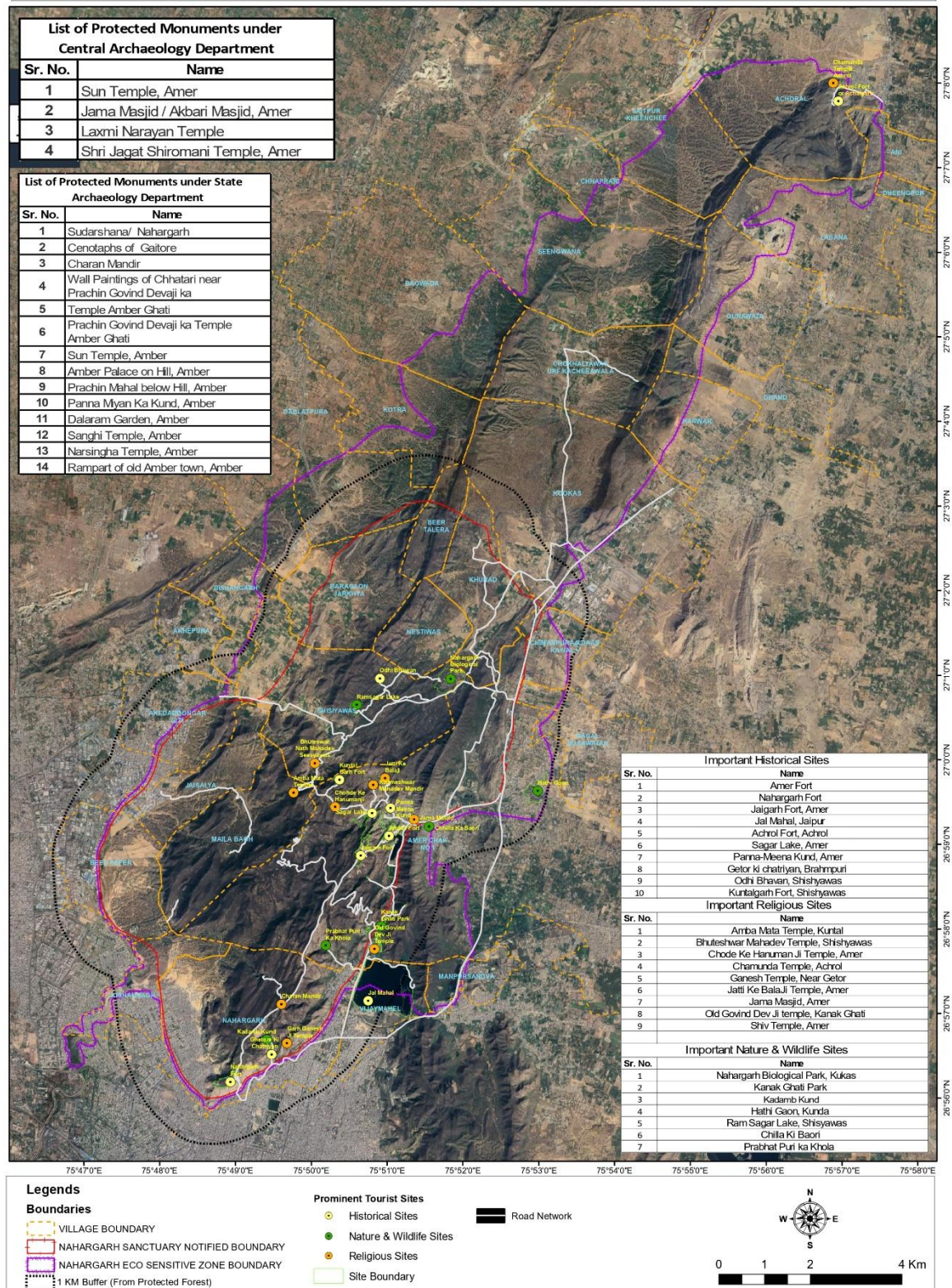


* Note Item 1, 2, 4,5, 6, 7, 9, 10, 12, 13, 14, 15, 20, 21, 22 and 24 of permitted use premises of Rural Area can be considered by the statutory committee of JDA

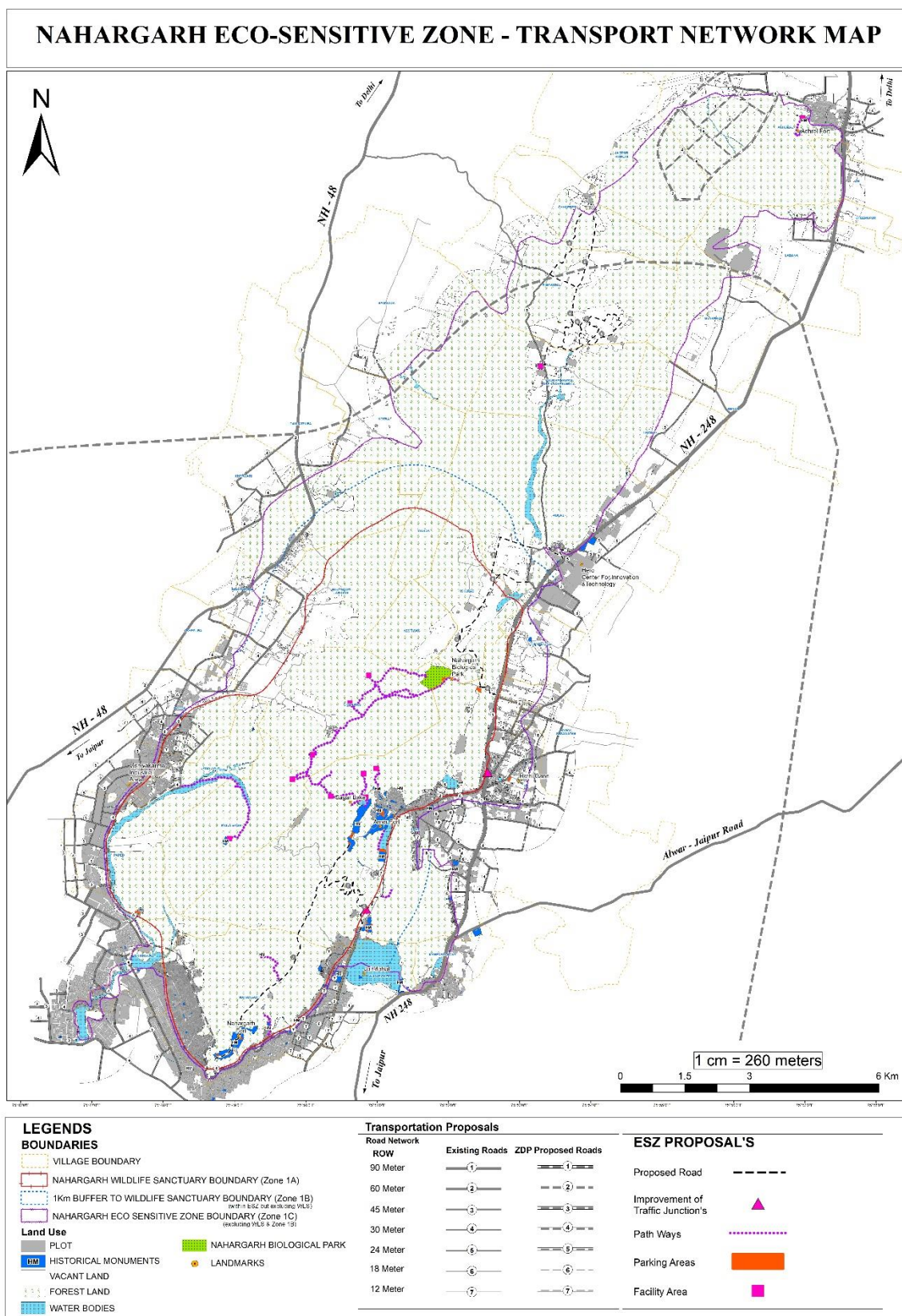


ANNEXURE- 14 MAP SHOWING THE SITE LOCATIONS WITHIN WLS

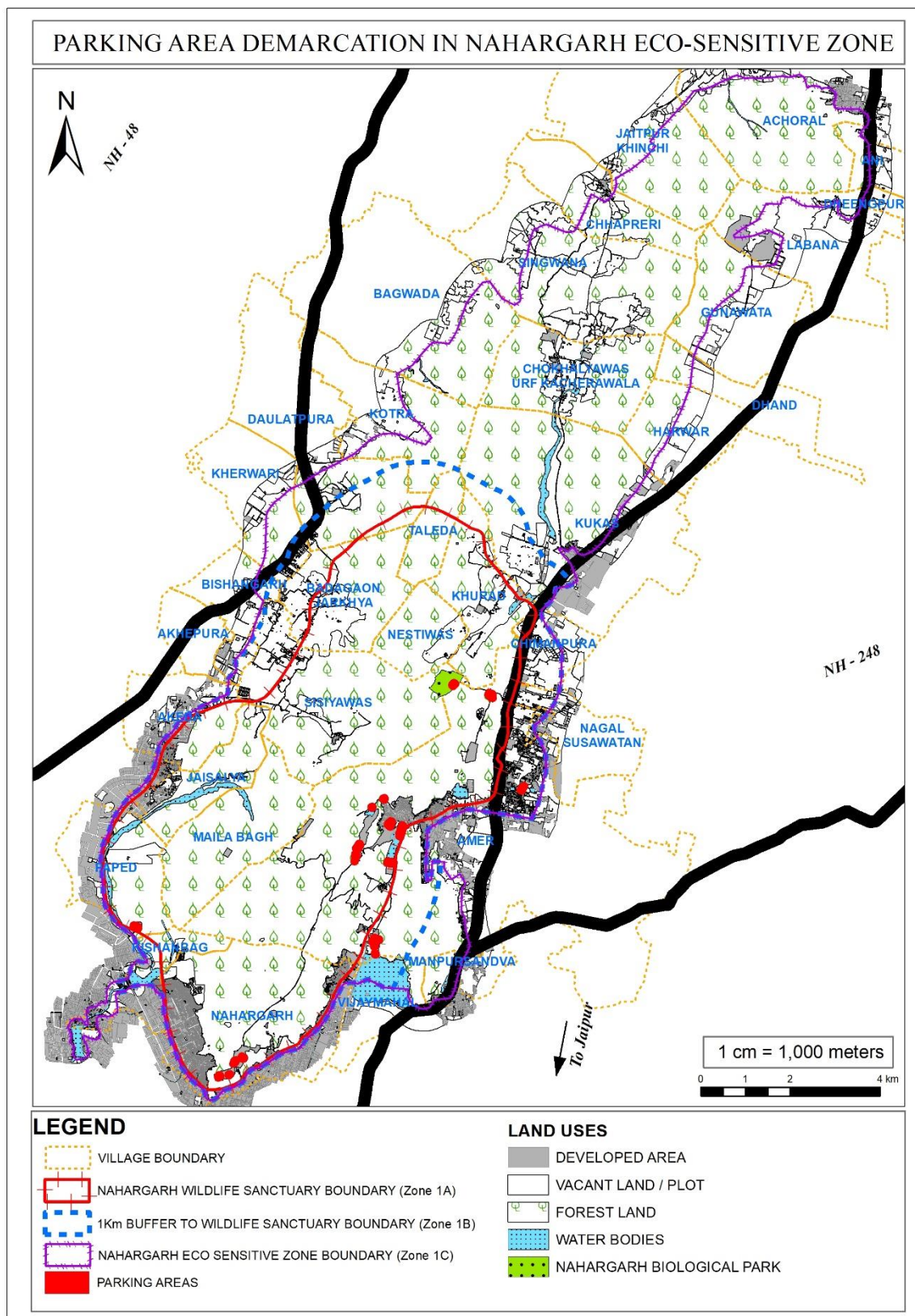
PROMINENT TOURIST LOCATIONS, ESZ, NAHARGARH



ANNEXURE- 15 TRANSPORTATION NETWORK MAP OF NAHARGARH ESZ



ANNEXURE- 16 PARKING AREAS AT DIFFERENT TOURIST LOCATIONS



ANNEXURE- 17 TOURISM MAP OF NAHARGARH ESZ

1	Sun Temple, Amer
2	Jama Masjid / Akbari Masjid, Amer
3	Laxmi Narayan Temple
4	Shri Jagat Shiromani Temple, Amer
5	Sudarshana/ Nahargarh
6	Cenotaphs of Gaitore
7	Charan Mandir
8	Wall Paintings of Chhatari near Prachin Govind Devaji ka
9	Temple Amber Ghati
10	Sun Temple, Amber
11	Amber Palace on Hill, Amber
12	Prachin Mahal below Hill, Amber
13	Panna Meena Ka Kund, Amber
14	Dalaram Garden, Amber
15	Sanghi Temple, Amber
16	Narsingha Temple, Amber
17	The rampart of old Amber town, Amber
18	Chilla Ki Baori
19	Jaigarh Fort, Amer
20	Kadamb Kund
21	Kuntalgarh Fort, Shishyawas
22	Nahargarh Biological Park, Kukas
23	Odhi Bhavan, Shishyawas
24	Prabhat Puri ka Khola
25	Ram Sagar Lake, Shishyawas
26	Sagar Lake, Amer
27	Amba Mata Temple, Kuntal
28	Bhuteshwar Mahadev Temple, Shishyawas
29	Chode Ke Hanuman Ji Temple, Amer
30	Ganesh Temple, Near Gator
31	Jatti Ke BalaJi Temple, Amer
32	Shiv Temple, Amer



NAHARGARH ECO-SENSITIVE ZONE - TOURISM MAP

