



# Hiran Minar

A Mughal Urban  
Sanctuary

20  
55

Eco-Tourism &  
Restoration Master Plan



**The Urban Unit**  
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



**Tourism, Archaeology and  
Museums Department,**  
Government of the Punjab

# Hiran Minar –

## *An Urban Mughal Sanctuary*

### Eco-Tourism and Restoration Master Plan, 2055



**The Urban Unit**

Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



**TOURISM,  
ARCHAEOLOGY AND  
MUSEUMS DEPARTMENT**  
Government of the Punjab

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# 1. Hiran Minar

## *An Urban Mughal Sanctuary*

### 1.1. Historical Significance

Hiran Minar is a historical monument located in the city of Sheikhpura, Punjab, Pakistan. It was built during the reign of Mughal Emperor Jahangir in early 17th century. The reserve was built in a scrub forest that allowed Mughal emperors to experience a sense of semi-wilderness near the imperial city of Lahore. The wildlife reserve was used as a park where visitors could enjoy the sport of hunting.

The Minaret itself was constructed in memory of Jahangir's beloved pet deer, which is reflected in the meaning of "Hiran". Hiran Minar serves both as a commemorative tower and a part of a larger complex that includes a reservoir, adding to its architectural significance. The tower features an octagonal base with a single minaret that stands tall above the surrounding landscape. The practice of building such tomb-markers over the skulls of game animals is an ancient Persian custom.

Over the years, Hiran Minar has become a symbol of Mughal architecture and the emperor's love for his wildlife companions.

### 1.2. Tag of 'Mughal Sanctuary'

Nestled just beyond the reach of Lahore's ever-expanding urban sprawl, Hiran Minar in Sheikhpura offers a rare and seamless escape to a serene oasis where history, architecture, and nature converge. With its tranquil water body, manicured lawns, and forested surroundings, this 17th-century Mughal retreat is not only a testament to imperial grandeur but also an ideal refuge for city dwellers seeking peace and inspiration. Its proximity to Lahore makes it the most accessible sanctuary for those craving a breath of fresh air, a walk-through heritage trail, and a moment of stillness away from the chaos of modern life. This is why it is proposed to position Hiran Minar as **"The Urban Mughal Sanctuary"**—a place where the legacy of the past becomes a living, breathing escape for the present.



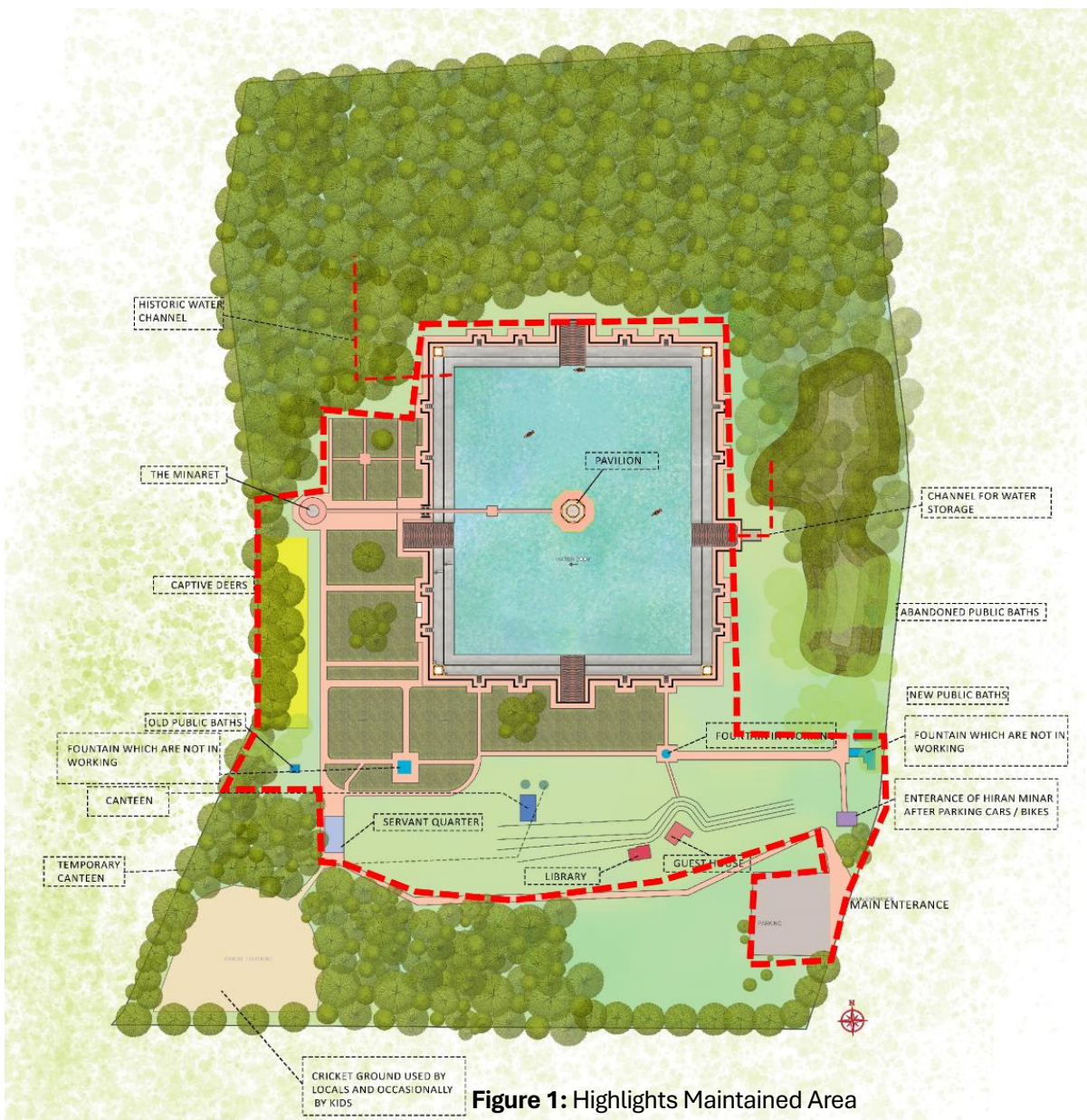
# 2. Hiran Minar Master Plan

## 2.1. Background

The total area of site is approximately 42 Acres.

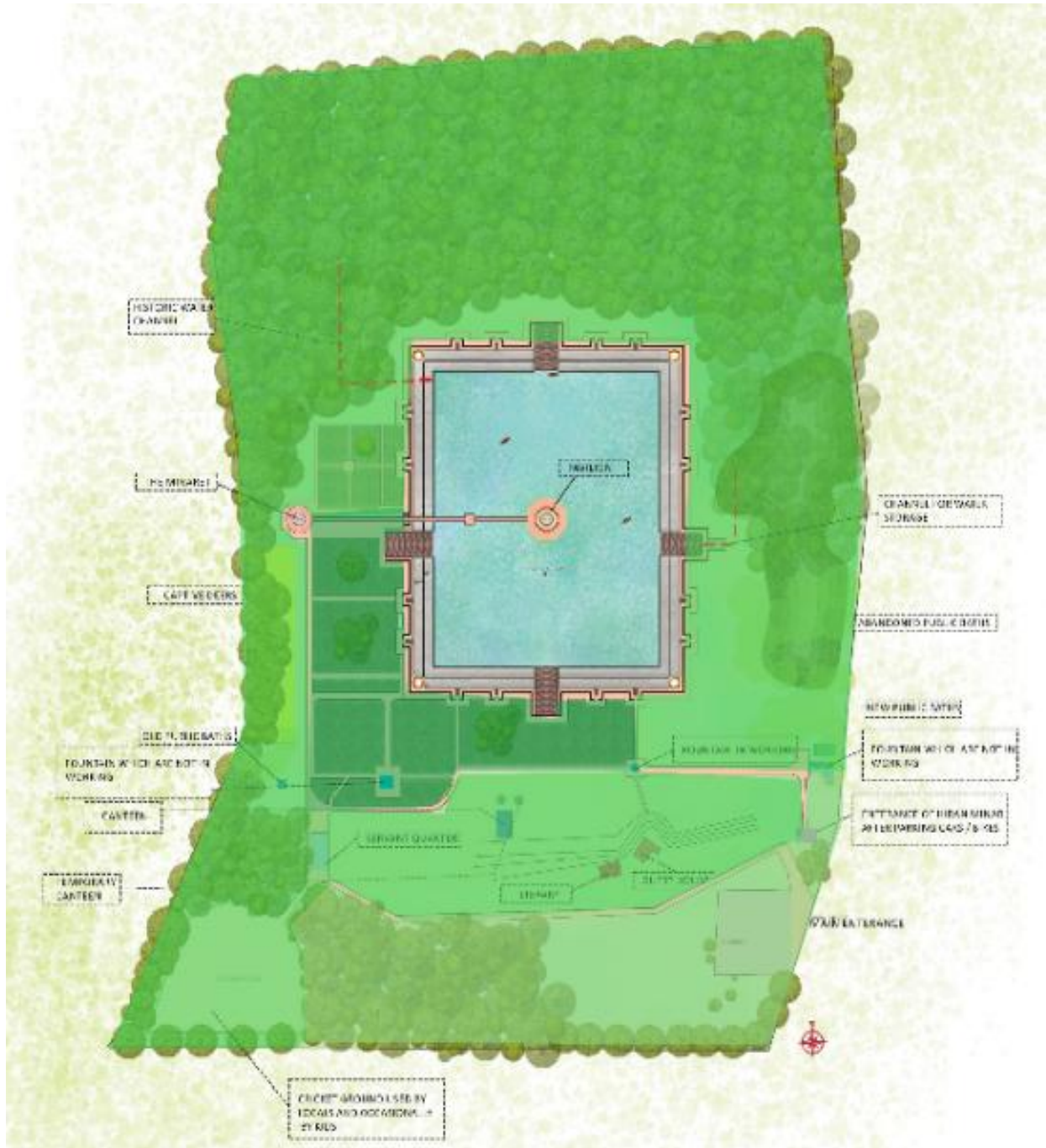
Publicly maintained area of approximately 16 Acres

With a minimum of 25 Acres of Land either Neglected or Underutilized

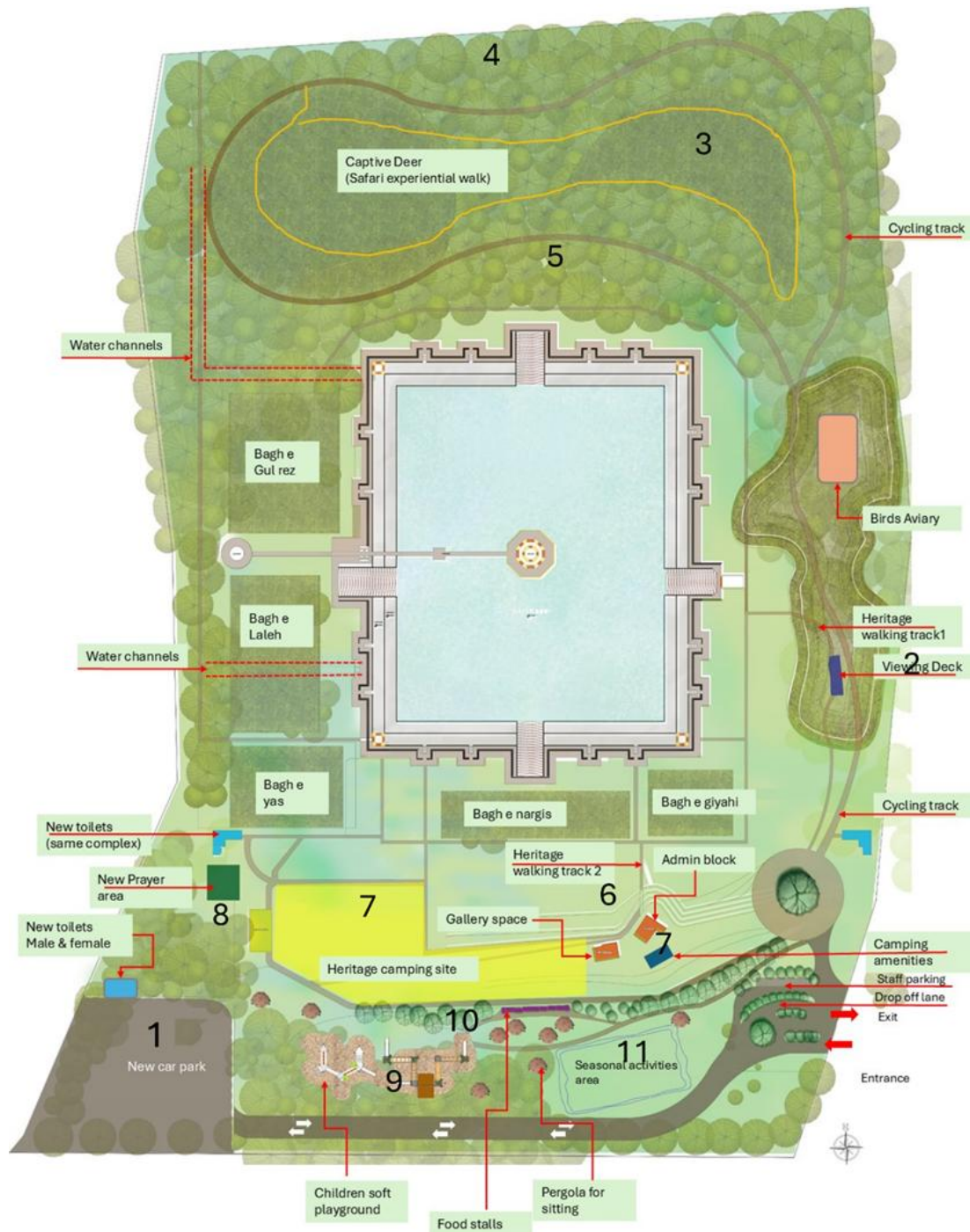




The land around the pavilion and minaret is identified as having a great opportunity to develop as a master plan proposal to enhance the site attraction of Hiran Minar and to effectively immerse visitors in the Mughal history. The following proposal is sensitively designed to highlight and enhance the Mughal narrative of Hiran Minar in such a way that interventions do not overshadow the serenity of this site but provide the user with an immersive nature experience.







### Key Facilities in Proposed Masterplan:

- |                       |                                   |                              |
|-----------------------|-----------------------------------|------------------------------|
| 1. Designated Parking | 2. Viewing Deck                   | 7. Heritage camping facility |
| ▪ Drop-off lane       | 3. Deer walking safari experience | 8. New Praying Area          |
| ▪ Staff parking       | 4. Bicycle track                  | 9. Children soft Playground  |
| ▪ Public parking      | 5. Heritage Walks                 | 10. Food stalls              |

- Separate entry and exit
- 6. Virtual gallery of Hiran Minar history
- 11. Seasonal event place like Spring

## 2.3. Hiran Minar Master Plan Vision

The proposed Master Plan for Hiran Minar reimagines the site as an immersive heritage experience that brings the legacy of Emperor Jehangir to life. Rooted in the historical context of Jehangir’s deep appreciation for nature, wildlife, and landscape aesthetics so vividly recorded in the *Jehangir Nama*, the proposal introduces curated heritage trails, scenic viewing decks, and a unique captive deer walking experience, all designed to evoke the ambiance of a Mughal-era sanctuary. Flower gardens inspired by those mentioned in the emperor’s memoir add sensory richness, while a bird aviary and deer safari pay homage to Jehangir’s passion for ornithology and royal hunting. By weaving these elements into fabric of the site, the Master Plan transforms Hiran Minar into a living narrative of Mughal leisure, environmental sensitivity, and imperial grandeur.

### 3. Literature Review & Design Proposal

The fourth Mughal emperor, Jahangir (b. 1569, r. 1605-27) was known for his deep fascination with nature, which he clearly described in his autobiography, *Jahangir Nama*. He patronized artists to paint the birds, plants, flowers, and animals in the most realistic manner possible. He inherited his passion for Nature from Babur and his father, Akbar. But it was during Jahangir's period that the genre of natural history paintings took shape because artists' emphasis on portraying plants, animals, and birds with great accuracy, and individual characteristics.



JAHANGIR IN DARBAR WITH A WHITE FALCON. India, Mughal period, ca. 1605. Opaque watercolor and gold on paper. 29 x 21.1 cm. Courtesy of the National Library of Russia. Dorn 489, folio 80b

### 3.1. Flower Gardens in Hiran Minar Master Plan

Common flowers/plants referenced in Jahangir Nama and Mughal Gardens:

- **Roses (Gul)** – Jahangir admired roses, particularly due to their fragrance and beauty.
- **Tulips** – Introduced to Mughal gardens, appreciated for their variety and vibrant colors.
- **Lotus (Kamal)** – Frequently symbolized in Mughal art and culture; mentioned for its association with beauty.
- **Marigold (Genda)** – Popular in Mughal gardens, though not always explicitly referenced in Jahangir Nama.
- **Jasmine (Chameli/Mogra)** – Jahangir appreciated fragrant flowers like jasmine.
- **Narcissus (Nargis)** – Jahangir was fascinated by delicate flowers, and narcissus was often praised in Persian literature. Narcissus is one of the many flowers mentioned by Jahangir from his travels in Kashmir, which he referred to as a “*perennial garden.*” According to the emperor, Ustad Mansur drew more than a hundred pictures of the Kashmir flowers, but only a handful of his works are known. Most notable among them is a painting of tulips with a butterfly and a dragonfly hovering over the flowers.
- **Lilies (Sosan)** – Often found in Mughal-era gardens.
- **Cypress Trees (Sarv)** – Though not a flower, cypress trees are mentioned frequently as symbolic elements of Mughal gardens.

Jahangir also instructed painters to document rare plants and flowers meticulously, many of which are depicted in Mughal miniature paintings of the time.

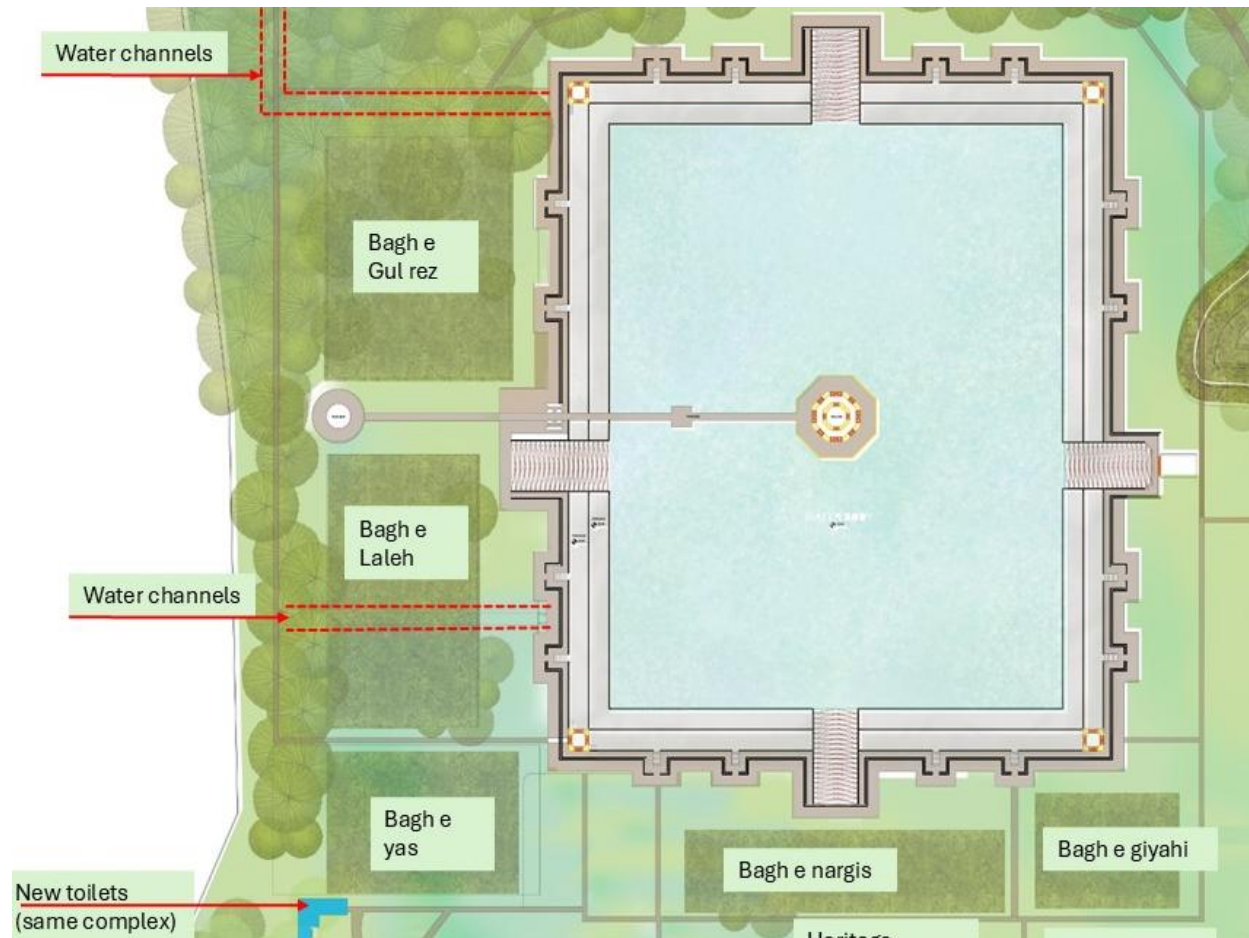


### 3.1.1. Proposed Flower Gardens on-site

The flower gardens proposed in the Master Plan are the five flowers mentioned in the Jahangir Nama.

It is also proposed that landscape restoration on-site should be made a mandate, and the Forest Department should actively invest in reviving gardens in Hiran Minar site to its original grandeur.

Reference is a heritage park in India-studied as a case study for developing the Gardens of Hiran Minar in detail in next stage of design proposal involving a Landscape designer.



### 3.1.2. Case Study & Inspiration to Develop the Flower Gardens in Hiran Minar Site

The heritage park is a redevelopment landscape project, envisioned in the heart of Old Delhi, opposite Red Fort. The site is blessed with panoramic views of the Red Fort with Jamia Masjid right behind it. Envisioned as a heritage escape, the park brings a harmonious unison between Mughal and Hindu architecture.

The design for the park aims to reflect historical importance and retain cultural impact of the location, with its elements and materials. Despite this, the design presents a modern influence in its detailing and technique.



**Landscape Restoration:**

The landscape around and within those heritage sites not only enhances the beauty and importance of heritage sites but also increases economic and ecological value of the place.

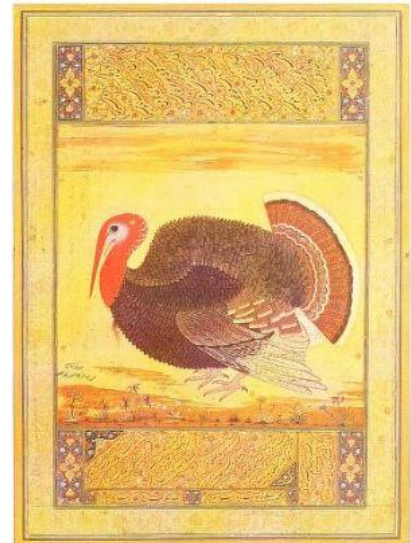
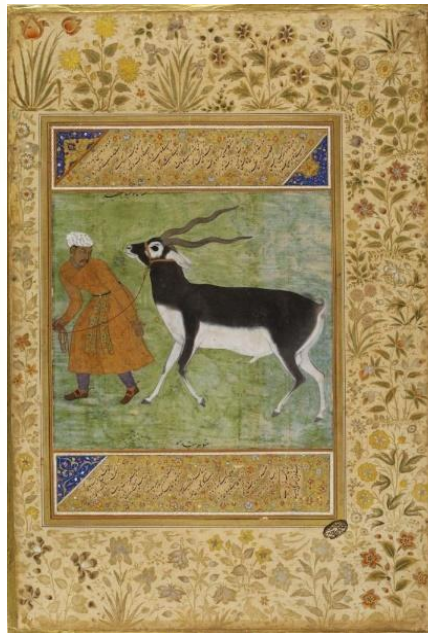
Traditionally, historical preservation efforts have generally dealt with the landscape as an adjunct to significant buildings; it is realized that the historic landscape involves much more than mere architectural embellishment. In addition to buildings, the historic landscape embraces a broad and complex assemblage of interrelated natural and cultural features that establish the essential fabric for many historic sites, districts, neighborhoods, communities, and even entire regions.

### 3.2. Fauna on-site and Inspiration

Jahangir’s deep interest in nature and animals was shaped by a combination of personal upbringing, cultural heritage, and natural curiosity. Growing up in Emperor Akbar’s court, he was exposed early to royal gardens, hunting traditions, and a variety of animals, fostering a love for the natural world. Influenced by the Mughal-Timurid Persian appreciation of gardens and landscapes as symbols of paradise, Jahangir extended this cultural admiration into a more scientific approach. His naturally inquisitive temperament led him to document animal behaviors, bird migrations.



PRINCE WITH A FALCON. India, Mughal period, 1600–1605. Opaque watercolor, ink, and gold on paper. 14.3 x 8.6 cm. Los Angeles County Museum of Art, from the Nasli and Alice Heeramaneck Collection, Museum Associates Purchase. M.83.1.4

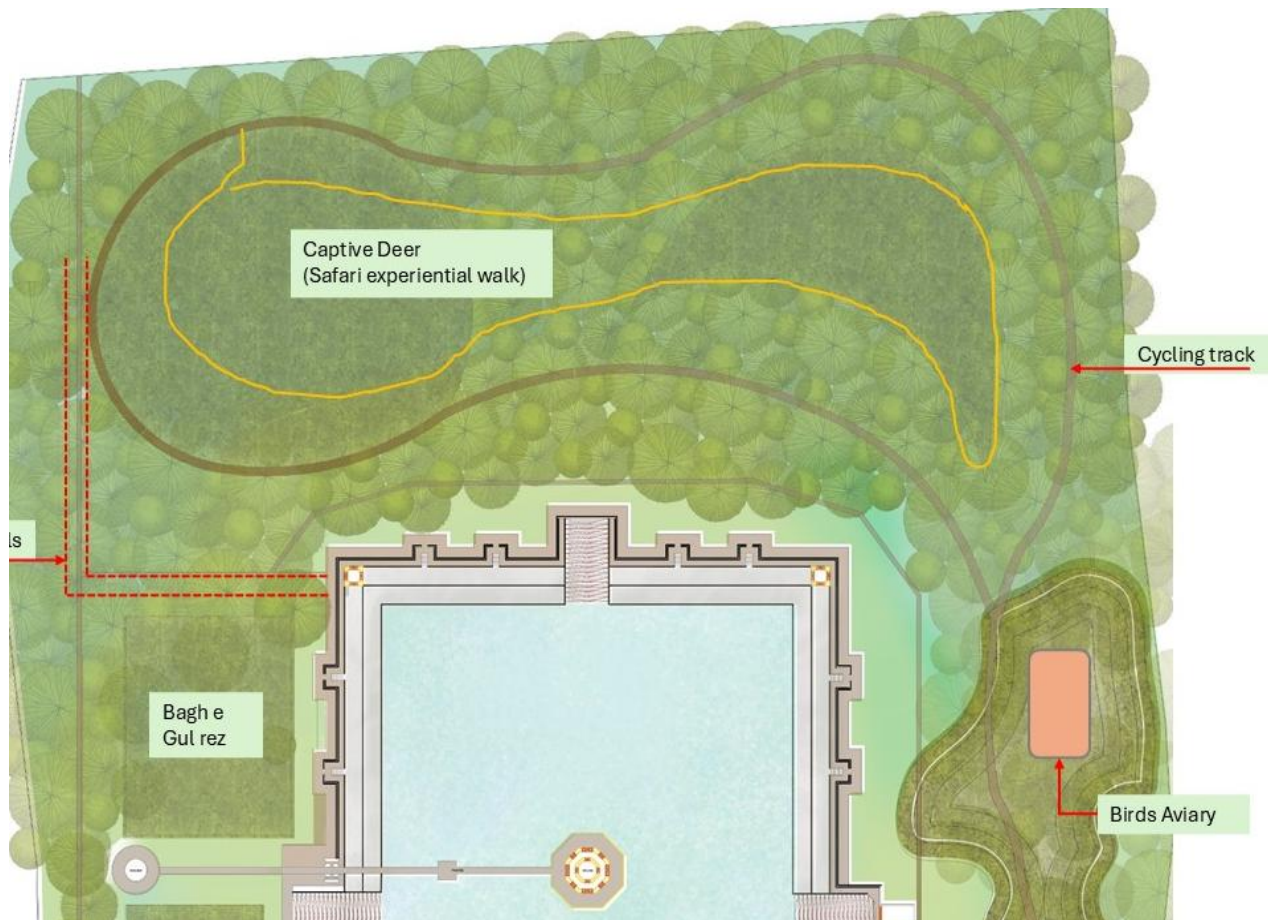


NORTH AMERICAN TURKEY, by Mansur. India, Mughal period, ca. 1612. Opaque watercolor on paper. 22.5 x 15.5 cm. Courtesy of the Trustees of the Victoria and Albert Museum. IM.135-1921

A birds’ aviary is proposed on-site at the far contour hill on site which is currently abandoned with local growth of shrubs and landfill. The natural course of the track takes the direction from the birds’ aviary to deep forest, where, along with cycling track, it is proposed to be developed as a natural Deer captive in a way that the current deer in captivity are replaced in a more natural and spacious environment. The more natural habitat will also advocate for having more additions in the number and breeds of deer addition including Blackbuck, as we see that mentioned in Jehangir’s memoir.



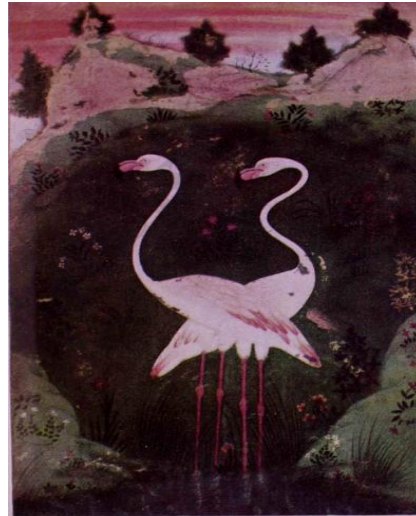
**Figure 2:** Some Figures of Birds Paintings from Jahangir's Collection



**The estimated area of birds' Aviary is 6700 sqft.**

**The estimated area of Captive Deer experiential Safari is: 7Acres**

### 3.3. Birds Aviary



Flamingos in a pool, around 1620, 4.7 x 3 inches, Sir Cowasji Jahangir Collection



White-breasted kingfisher, around 1625, 6.5 x 6 inches, Sir Cowasjee Jahangir Collection.



Indian Pitta, around 1625, Sir Cowasjee Jahangir Collection

**Figure 3:** Some Figures of Birds Paintings from Jahangir's Collection

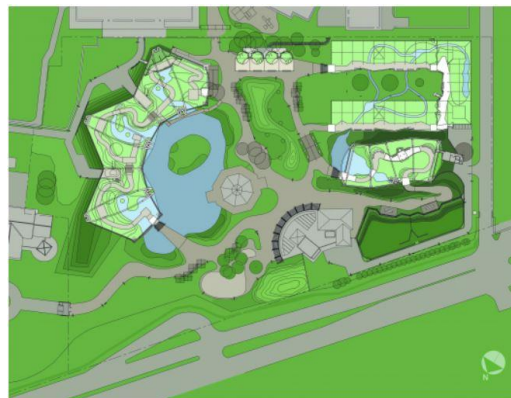
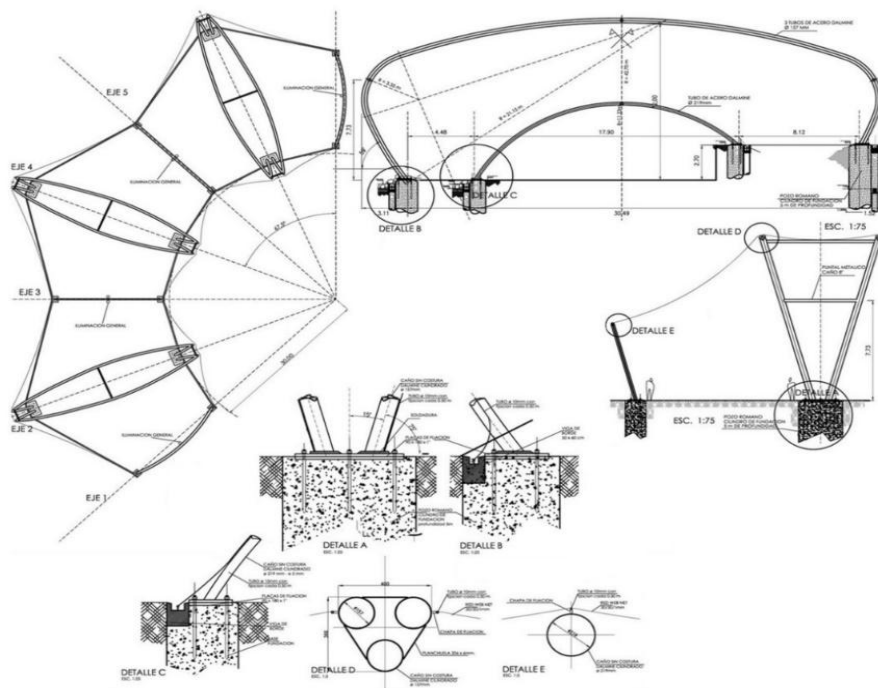
### 3.3.1. Case Study for Birds Aviary

Aviary, Bio Parque Temaikén

Location: Escobar, Province of Buenos Aires, Argentina

Architects In Charge: Jorge Hampton, Emilio Rivoira.

- Covering birds' habitat with a net and bearing arches, requiring complex geometries
- Over 250 species, each with unique spatial layers, define cage dimensions, connectivities, and ecosystem settings. Inner pathways of aviaries span 4500 meters.
- The Great Aviary is a 12m high structure with 12m high double arches and 30m of structural light, spanning 900m<sup>2</sup> each.
- Enclosed in stainless steel mesh, it faces a central lake, with paths varying in topography and visibility.
- Aviaries offer viewing platforms, aquatic areas, bridges, waterfalls, and hummingbird libation areas, with wooden cylinders and double chain curtains for bird transition.



### **3.3.2. Conclusion:**

Because of its surroundings, Bio Parque Temaikén's aviary makes an excellent case study for the proposed bird aviary at Hiran Minar. This aviary faces a lake, just like Hiran Minar, and since it is on a much larger site than the proposed one, alternative frame styles or materials can be used.

# 4. Protocols for Developing a Deer Safari experience in Hiran Minar site

## 4.1. Objectives

- Conservation of Species
- Tourism Enhancement
- Research and Education
- Welfare and Health
- Public Engagement and Awareness



## 4.2. Habitat Management

Deer Safari at Hiran Minar will enhance tourism practices and conservation strategies. Captive Wildlife practices are old and ineffective for tourism. We need to develop advanced strategies at tourism sites to enhance community awareness and tourism. Mini Deer Safari is important at the Hiran Minar Area to preserve archaeological sites and promote tourism. Area characteristics and historic records show that the site is highly suitable for various deer species. Topography, land criteria, and geomorphology support deer safari strategies at the Hiran Minar site.

## 4.3. Physical Characteristics

### Land Use

Land is divided into distinct sections for wildlife, visitors, and management. The area, which shows dense forest and has potential for visitors to approach easily to watch and enjoy safari features, the area is approximately 07 acres along walking and cycling

|                   |  |
|-------------------|--|
|                   | tracks. These sites will provide an opportunity for communities, students, researchers, and children to make their trip useful.  |
| <b>Topography</b> | The land is relatively flat, sloping to facilitate deer safari and recreational events. However, area characteristics and historic records show that the site is highly suitable for various deer species.   |
| <b>Soil</b>       | The soil quality is important and is good for managing the deer safari at Hiran Minar. Geomorphology resembles the natural habitat of the deer family. The historic records are also good evidence to declare the area suitable for a deer wildlife safari at Hiran Minar.   |
| <b>Vegetation</b> | <p>Pastures and Forage: The land is suitable and includes areas of natural habitat. Habitats have grasses and other grazing materials, and more can be grown to enhance protection, preservation, conservation, and management.</p> <p>Feed Crops: Depending on the type of wild animals, vegetation can be grown inside the safari area to enhance habitat suitability. It depends on the animal species to be selected for the deer safari at Hiran Minar.</p> |

#### 4.4. Required Protocols at Hiran Minar (Deer Safari Establishment)

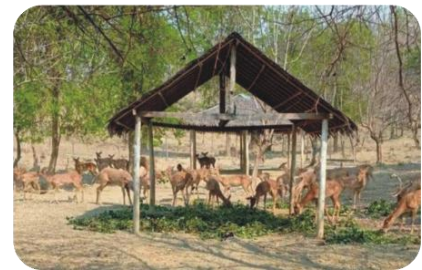
|                      |   |
|----------------------|---|
| <b>Shelter</b>       | Structures such as barns, stables, or sheds provide shelter for animals, protect them from extreme weather, and facilitate management tasks like feeding and milking. Shelters must be natural materials to keep the habitat in suitable conditions. See the map for detailed shelter design and locations. |
| <b>Fencing</b>       | Fencing is used to manage animal movement and keep them within designated areas. It can range from simple barbed wire to more sophisticated electric fencing. For details, see “Ungulates recommended Enclosure dimensions.” The proposed area of Hiran Minar is approximately 300000 sq. ft. or 7 Acres.   |
| <b>Water Supply</b>  | Adequate water sources are critical. This could be natural water bodies, wells, or piped water systems to ensure a constant supply for the animals. Water quality and periodic analysis are necessary for effective protection, preservation, conservation, and management.                                 |
| <b>Watch Towers</b>  | Two Watch Towers in Hiran Minar Deer Safari are recommended according to the layout plan mentioned in the map. These watch towers are important for monitoring, protection, preservation, conservation, and management strategies.  |
| <b>Fodder Points</b> | There must be some reasonable and appropriate fodder points in the area inside the fencing to provide high-quality fodder to the deer. There must be checks and balances on the food delivered by the visitors to the animals in case of the allowance of these activities.                                 |

|                                    |  |
|------------------------------------|--|
| <b>Snags and Salt</b>              | Some old wasted trees in natural areas are crucial to make the habitat look natural for wild animals. These old tree trunks in the habitat are called snags and provide a natural look to the habitat.<br>Further, salt is mandatory for deer species to thrive in natural ecosystems.   |
| <b>Veterinary Services</b>         | Animal health is the priority during all these protocols. Appropriate animal health analysis is necessary during the management process and habitat management. DVM expert services are required to maintain animal health, biosafety, and biosecurity as well.  |
| <b>Sign Boards</b>                 | Sign boards with guidelines are crucial to be installed at specific sites to maintain the visitors area in a disciplinary manner. Visitors can easily approach the selected area for their desired goal. These practices are also helpful in risk mitigation planning.   |
| <b>Natural Environment</b>         | It is important to keep the environment natural to get the best results from tourism practices. Shelter places must be constructed with nature-based materials like wood, wooden chips, Bamboo, Saccharum munja materials, and other materials that make the ecosystem natural in safari areas.  |
| <b>Biosecurity &amp; Biosafety</b> | There must be some separate zones in the area to quarantine the animals in case of disease or transportation procedures.<br><br>There should be a comprehensive procedure for culling management of the deer safari areas to overcome health-related issues.<br><br>There must be leeches, snake bite prevention devices, and a proper night monitoring system to overcome snake bites and predator control. |
| <b>Guides</b>                      | A 300000 sq. ft. area establishment required some guides to lead the visitors, researchers, and tourists to make useful and successful tours in the safari areas.  |
| <b>Drone Monitoring</b>            | The use of AI is important in the modern world. Thermal night vision cameras can be installed for better protection, preservation, conservation, and management of required areas.   |
| <b>Housing Standards</b>           | Minimum housing standards and fencing are necessary for sustainable conservation according to international rules and regulations. (See table: Ungulates recommended Enclosure Dimensions). “Size & Social Guidelines”.  |

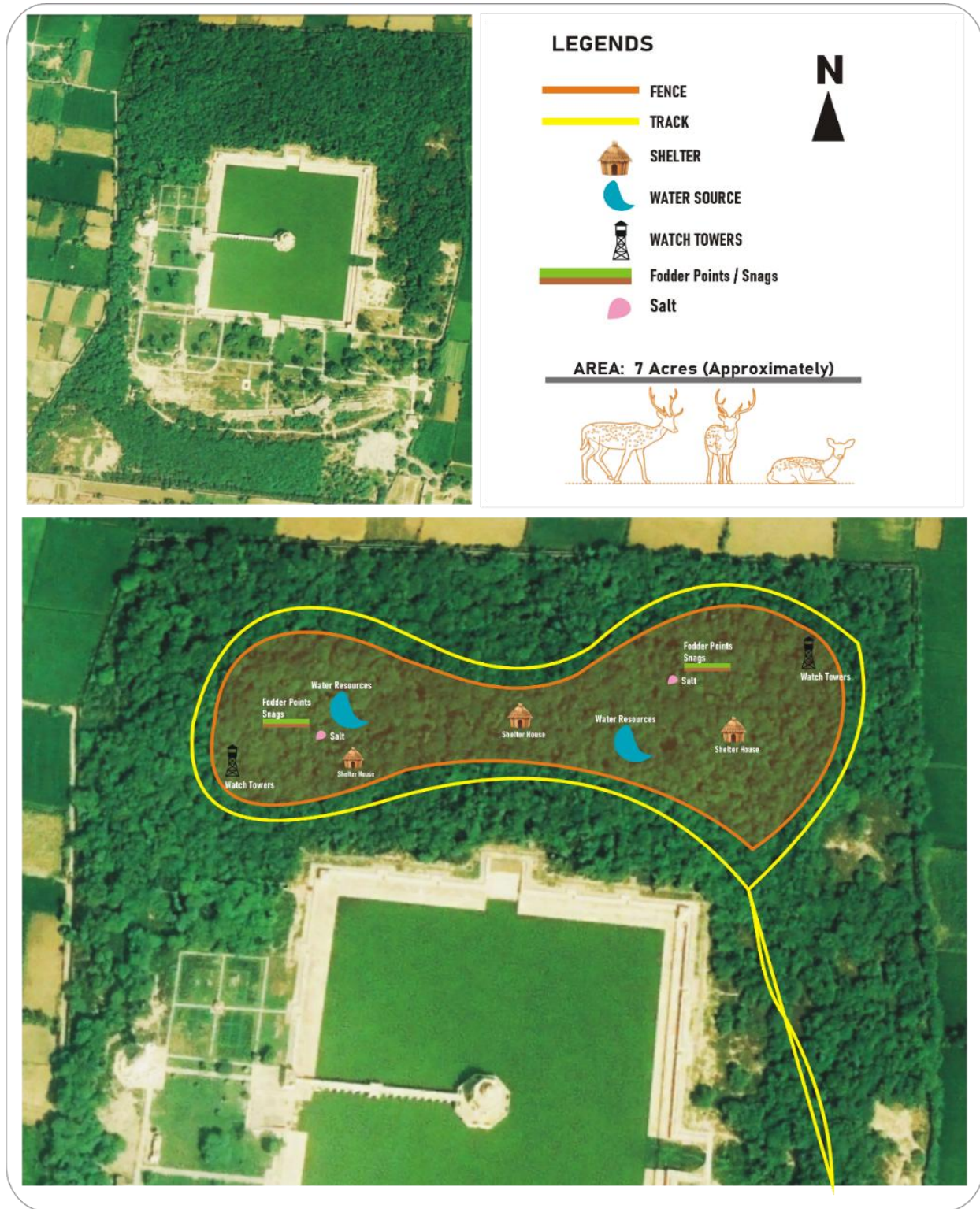
## 4.5. Ungulates Recommended Enclosure Dimensions (Size and Social Guidelines)

| Sr. | Species          | Housing Type | Appropriate Group Size with Male/Female Ratio     | American Association of zoos and Aquaria (AZA)           | Others |
|-----|------------------|--------------|---|--|--------|
| 1   | Chinkara gazelle | Outdoor      | 1*:6 (Visual barrier between males is mandatory). | 18 sq m/ 200 sq ft per animal<br>200 sq. ft. (18.2 Sq m) |        |

|   |                              |         |   |   |  |
|---|------------------------------|---------|---|---|--|
| 2 | Black Buck                   | Outdoor | 1*:25 (Visual barrier between males is mandatory.                 | 28 Sq. m / 300 Sq. ft. for each animal.                     |  |
| 3 | Hog Deer/<br>Spotted<br>Deer | Outdoor | 1:10  | 1000 Sq. m for a Pair.                                      |  |
| 4 | Sambar/<br>Red Deer          | Outdoor | Sambar 1:5 & Red Deer 1*:5 Visual barrier B/W males is mandatory. | 1000 sq. m. for a herd of five (1000 for each extra animal) |  |



### 4.5.1. Site Map



#### 4.5.2. Adaptive re-use of current Deer Captive

The current Deer Captive can be used to have farm animals, including goats, sheep, encouraging a more interactive experience with visitors, as farm animals are friendly and not dangerous. The user experience should include an option for feeding animals with the provided feed that can be bought at a subsidized rate.



**Figure 4:** The current deer captive

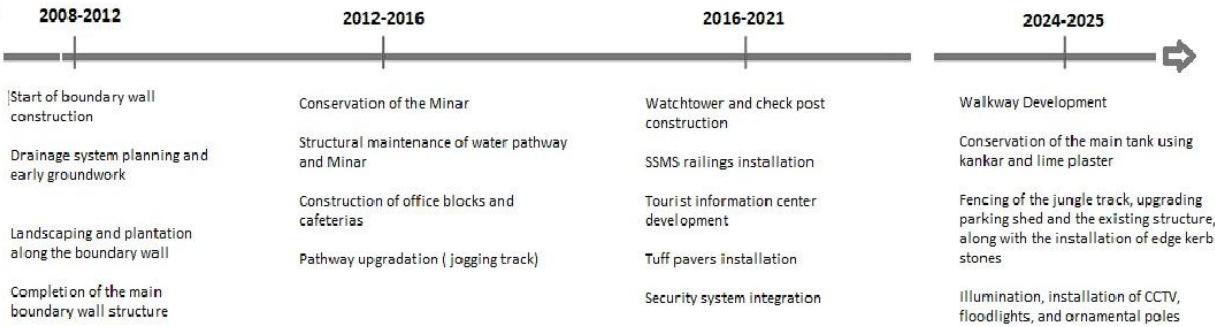


**Figure 5:** Proposed farm animals shelter

Such a barricade of shelter and setting encourages visitors to interact, feel safe, and enjoy an immersive experience with nature.

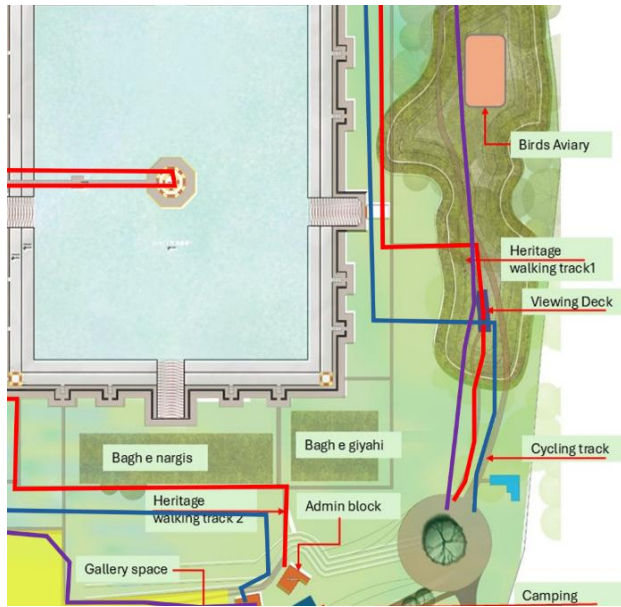
# 5. Hiran Minar Conservation & Developmental Timeline

The narrative of a built environment does not end with its historical background, significance, and methodology of construction and the period of neglect, but the narrative is complete when it talks about the contemporary efforts that are also presented, communicating to the public. This is not a complete narration, but also awareness of the built environment that is yet to be adapted in Pakistan. The site of Hiran Minar presents a good opportunity to have the archeological storytelling part of its heritage.



## 5.1. Site Viewing Deck

To enhance the visitors' experience and to introduce Heritage Trails of Hiran Minar, a viewing deck is strategically proposed at the far contoured end of the site, so as to provide an immersive and engaging visitor experience.



This viewing deck works as a conclusive spot to either start a trail or end a trail with important graphic information exhibited, including information related conservation of Hiran Minar over time, a brief history of Hiran Minar, and it also presents the concept of new Master Plan approach of Hiran Minar.



**Figure 6:** View from the existing Deck



**Figure 7:** Reference images for introducing a deck on site



**Figure 8:** Conceptual Design for proposed View Deck at Hiran Minar

## 5.2. Proposed Heritage Site Walk

### 1- Built environment and conservation strategies

This heritage walk (represented with Red Line \_\_\_\_\_ in the following figure) focuses on historical significance and key features as follows:

- The Mughal architecture
- Emperor Jehangir's dedication to nature

- Emperor Jehangir's favorite Black Buck history
- Conservation efforts of Hiran Minar over the years, including showcase of materials and materiality used for conservation

The walk starts from Virtual Gallery dedicated to brief history of Mughal Empire, Emperor Jehangir, and Hiran Minar and ends at the viewing deck.

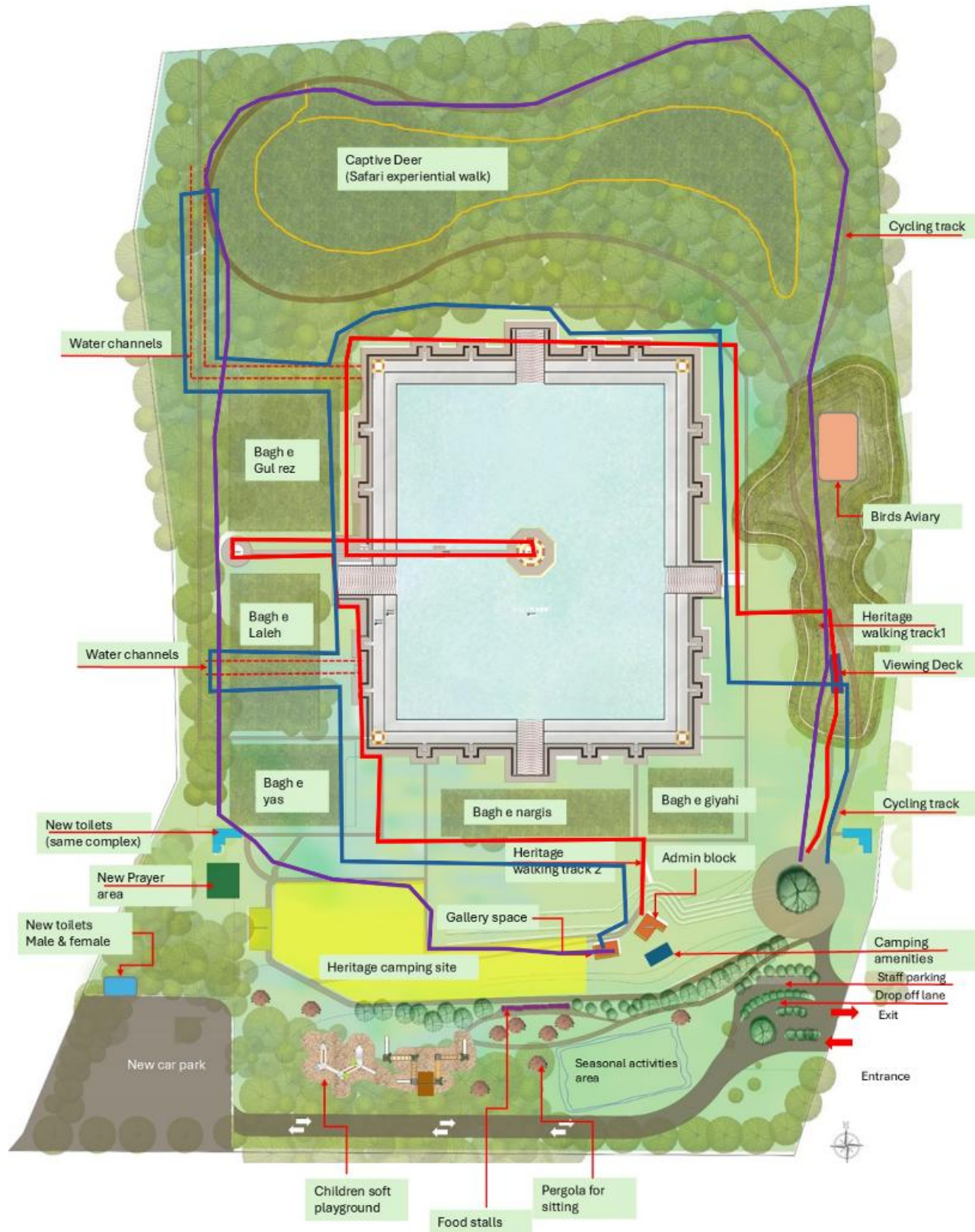
## **2- The historical find of Water Irrigation system of Hiran Minar**

This heritage walk (represented with Blue Line \_\_\_\_\_ in the following figure), starts at the viewing deck and continues to tell the conservation efforts of the Water body of Hiran Minar, the discovered Mughal water irrigation system of Hiran Minar, and ends at the Virtual Gallery

- Current water irrigation system
- Historic water irrigation system

## **3- Jehangir Nama, Emperor Jehangir's love for nature**

This heritage walk (represented with Purple Line \_\_\_\_\_ in the following figure). begins from viewing deck and trails through birds' aviary to the safari to flower gardens and ends at the Virtual Library.



**Figure 9:** Proposed Walkways in Hiran Minar

Such signages are encouraged to be placed every few meters on the track to direct visitors in the right way and give important piece of information where required.

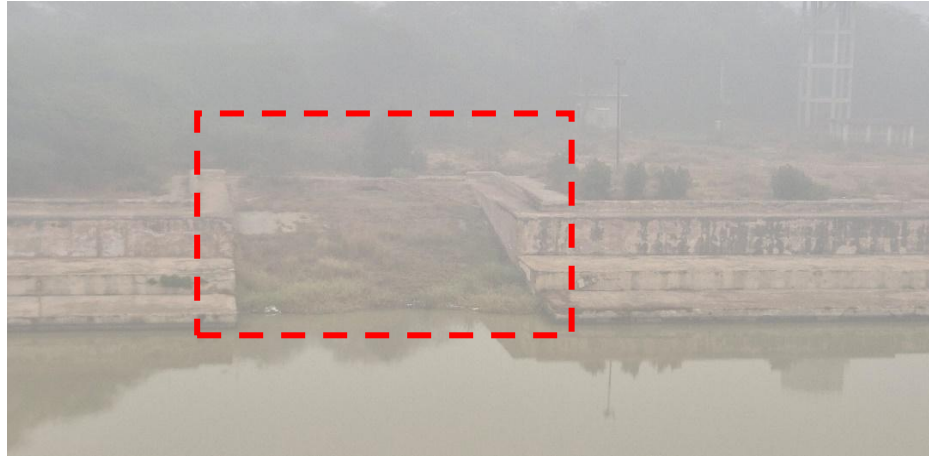


**Figure 10:** Signages should be placed at site

### **5.3. Hiran Minar Water Irrigation System**

The discovered water channels on-site are an archaeological milestone for Punjab to show the system developed in Mughal era to have a natural inlet and outlet for fresh water in bank made around the pavilion.

These water channels need to be preserved and restored with active efforts and a journey through Mughal era can be designed with a guided tour of how the system was designed back in time of no active technology or motor introduction. Following are a few pictures showing the current state of these water channels and how they provide a great opportunity for a great walk.



**Figure 11:** The Original water irrigation flow from canals is blocked with growth of shrubs.

The discovered and preserved water channel, shown below, is coming through the River Ravi developed in Mughal period for water intake, filtration and outlet as per over flooding.



One of the water channels in current lawns of Hiran Minar is blocked with landfill and needs an active strategic plan for conservation by Archaeology Department of Punjab. Retrieving this passage along with other underground historic water passage, the site has a great potential for educational tourism.

We can see this in figure given below, the clear walls yet to be discovered. We propose to have this Mughal era system of Water channeling exposed, restored and displayed.



**Figure 12:** Water channel in the lawn of Hiran Minar, blocked by solid waste

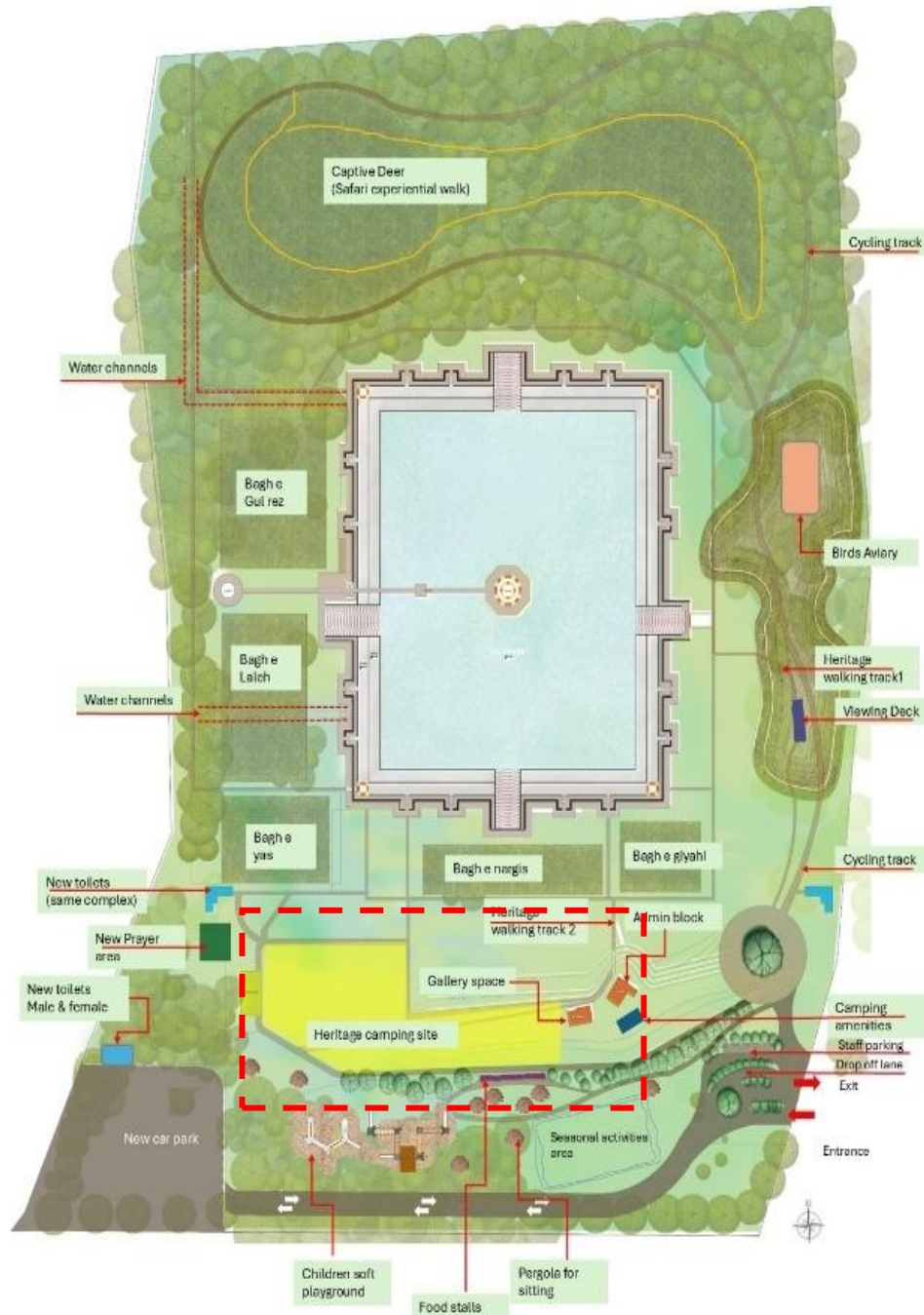


## 5.4. Heritage Camping, Hiran Minar

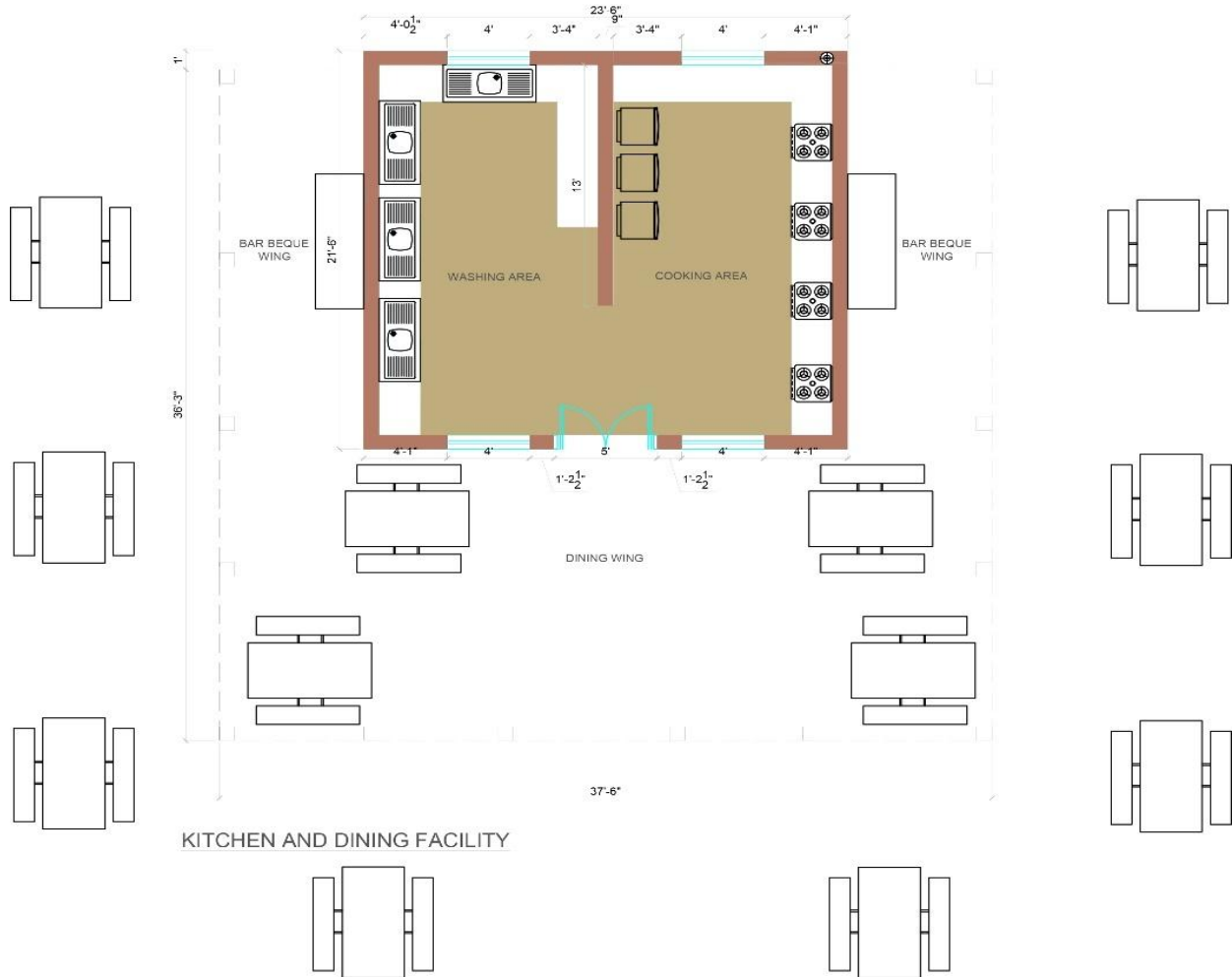
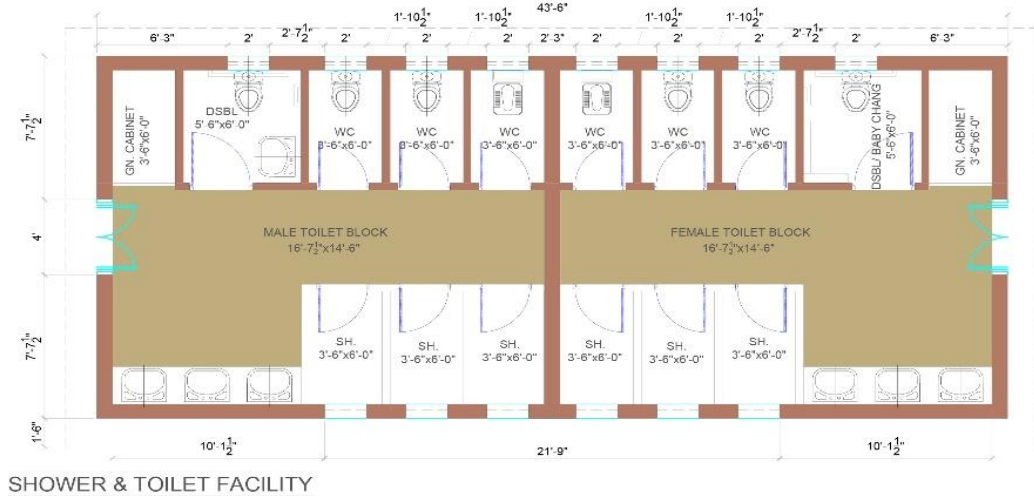
This unique camping site enables the nature and architecture lovers to enjoy this Mughal Sanctuary in a full moon night or a starry night. The Heritage camping encourages Punjab historic culture of storytelling, folklore singing, migratory birds watching, and poetry recitals.

It is very important to understand and set a rule that Heritage camping should not allow loud music speakers, as it is a heritage site with natural flora and fauna, and such noise pollution can have adverse effects on the surrounding environment. Heritage camping can have encampments inspired by Mughals, or individuals are encouraged to set up their camps as a group activity.

The facility is provided with open ground and a designated fireplace spot with amenities especially developed for campers and not for regular visiting public



**Figure 13:** Proposed location of Camping Site at Hiran Minar



**Figure 14:** Proposed Camping | Amenities Conceptual Design

### 5.4.1. Policy advice for heritage Camping

This facility includes a basic kitchen, shower, and toilets, barbeque, and dining area to encourage campers to have their food and lodging, as the Food stalls provided in Zone A are a facility for day visitors and are non-operational during night time.

So, the camping amenities facilities are designed to enable the campers to meet all basic requirements overnight. Separate toilet enclosures with shower rooms are provided. Kitchen is provided with basic pottery and crockery required for cooking and serving. The campers are obligated to clean after using the kitchen and a strict monitoring authority will be present on-site. To regulate these rules, it is important to introduce the concept of a security deposit before the campers move in. This deposit is refundable at the end of camping and is only kept as a security towards any damage that may occur by an individual.

To encourage families and females to camp actively in this protected area, it is crucial to allow family friendly space to camp the males are only allowed to camp if accompanied by a camping body (boy scouts organization, private adventure groups) that takes full responsibility for the code of conduct. Without the authoritative group involvement, males should not be allowed to camp if they are not accompanied by family.

### 5.4.2. Local Community Engagement

#### Objective

- To build a community-led stewardship model around Hiran Minar
- To reduce vandalism and littering through behavioral change and active surveillance
- To create livelihood opportunities for locals through site-based economic activities
- To educate and empower the local community as ambassadors of cultural heritage
- To enhance visitors experience through authentic local interaction

#### 1. Local Hiring for Site Operations

- Recruit local individuals for roles such as:
  - Tour guides (trained in history and language skills)
  - Maintenance and sanitation staff
  - Dispensary assistants and first aid providers

#### 2. Small Business Opportunities on Site

- Allocate stalls to locals for:
  - Souvenirs (handicrafts, postcards, books)
  - Traditional food and beverages
  - Eco-friendly products and bottled water
- Ensure that stalls are aesthetically designed to blend with heritage context

#### 3. Women-led Enterprise Initiatives

- Encourage local women to participate through crafts, textile products, or food items

- Provide micro-grants or partnerships with NGOs to build capacity

### 5.4.3. Informal Surveillance and Anti-Vandalism

#### 1. Community Watch Program

- Identify and incentivize respected locals to act as informal site stewards
- Enable reporting systems (via WhatsApp or help desks) for incidents of vandalism

#### 2. Code of Conduct for Visitors

- Place friendly yet firm signage on heritage ethics
- Use local volunteers to politely guide and remind tourists about appropriate behavior

### 5.4.4. Other facilities

Other facilities to support this initiative are to be permanently located in the Admin Block building, including:

- Dispensary
- Lost and Found
- Logistics official to take queries, complaints, and feedback
- Guard

## 5.5. Heritage Illumination Strategy

The primary aim of heritage illumination is to showcase architectural details and historical significance using theatrical lighting, enhancing the building's visual impact. This involves strategic placement of lights, the right lumen of lights to highlight features like arches, architrave, columns, creating a sense of depth and texture prominence.

### 5.5.1. Current Illumination Issues

The following images are from the current illumination electrical cables on-site that violate the Historic Building Protocols.

The foremost important point while installing lights on a historic building is a strategic approach to reduce the visual impact of exterior light fittings during the daytime view that can only be developed with a team of Design consultants of site designers, Illumination designers, and light fitting contractors.

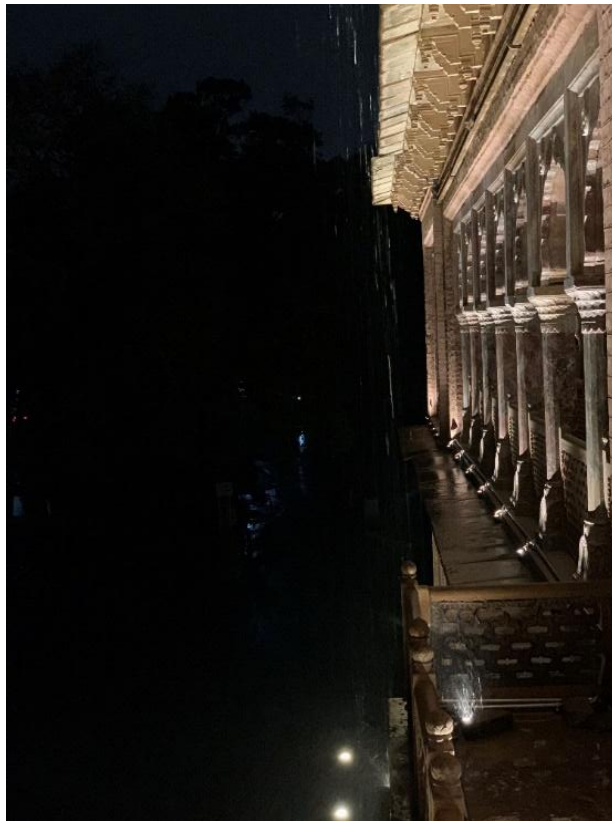


### **5.5.2. Reference for light illumination conducted by Expert**

An example of such illumination executed under Expert's supervision is the great building of the old college of Aitchison, by Sir Ganga Ram, completed in collaboration with Sellcon Group.



**Figure 15:** Side elevation, Aitchison's old building



**Figure 16:** First floor balcony, Aitchison's old building



**Figure 17:** Rear elevation, Aitchison's old building

### 5.5.3. Protocols of Illumination of Historic Buildings

Before even considering installing external lighting to any heritage site, one must carefully consider:

- The Building's location – rural or urban
- How much of the building should be lit
- The surrounding area that might be affected, including neighboring properties and spaces
- How to reduce the visual impact of exterior light fittings during the daytime view.

It takes particular knowledge and experience to get this right. It's important to maximize the aesthetic impact of these incredible buildings and enhance their unique features. It's a tricky balance to incorporate modern outdoor lighting whilst retaining the architectural integrity and historic fabric of the buildings. In addition, many historic buildings (like Minar-e-Pakistan) take a prominent position in the community, and the night time lighting can impact their neighbors.

#### Minimizing Visual Impact:

- **Discreet Placement:**

Position light fittings strategically to minimize their visibility during the day. Consider mounting them on adjacent structures, disguising them with landscaping, or incorporating them into architectural features.

- **Hiding Cables:**

Use existing service routes, cavities, or voids to conceal wiring as much as possible. Consider using conduit systems or cable trays for organized cable management. The conduit or cable trays to match the paint/external finish of the building, with cables hidden inside.

- **Appropriate Fixtures:**

Choose light fittings that complement the building's style and era, avoiding anything that clashes with the historic fabric.

- **Minimizing Glare and Stray Light:**

Use louvres, shields, and other accessories to reduce glare and stray light, further minimizing the visual impact of the lighting.

#### Respecting the Building's Integrity:

- **Protecting Architectural Features:** Take precautions to avoid damaging the building's surface or architectural details during installation
- **Avoiding Permanent Damage:** Use mounting methods that leave no permanent scarring or damage
- **Prioritizing Existing Structures:** Leverage existing service routes, conduit systems, or other infrastructure where possible to minimize new installations

#### Ensuring Safety and Functionality:

- **Low Smoke and Fume Cables:**

Use cabling with low smoke and fume (LSF) outer sheaths for safety

- **Proper Grounding and Wiring:**

Ensure proper grounding and wiring practices to prevent electrical hazards

- **Appropriate Lighting Control:**

Use lighting controls that allow for dimming and adjustable light levels, especially in multi-use spaces

- **Regular Maintenance:**

Develop a maintenance plan to ensure the longevity and performance of the lighting system

### Considerations of Specific Situations:

- **UNESCO Guidelines:**

UNESCO recommends avoiding bottom-up illumination for monuments and ensuring that lights are intercepted by the building facade to prevent light from straying

- **Modern vs. Historic:**

When retrofitting older buildings, be mindful of the unique attributes and requirements of the building's era, including color rendition and aesthetic non-obtrusiveness

- **Energy Efficiency:**

Consider energy-efficient lighting options like LED, while still ensuring compatibility with the building's historical character

## 5.6. Hiran Minar | An Energy Efficient Site:

Proposal for Making Hiran Minar an Energy-Efficient Heritage Site through Solar Power Integration

### 5.6.1. Background and Inspiration

The successful installation of solar energy systems at Jahangir's Tomb in Lahore serves as a guiding precedent. This initiative not only reduced the site's dependency on conventional electricity but also set a benchmark for eco-conscious heritage conservation in Pakistan.

### 5.6.2. Proposal Overview

This document recommends integration of **solar energy systems** at Hiran Minar to transform it into a model of sustainable tourism, reduce its carbon footprint, and ensure uninterrupted power supply for visitor services, security systems, lighting, and administrative functions.

### 5.6.3. Objectives

- Promote the use of renewable energy at heritage sites
- Reduce operating costs through long-term energy savings
- Ensure energy independence and reliability for the site's functions
- Enhance visitor experience with eco-conscious infrastructure

- Align with national and international sustainable development goals

#### 5.6.4. Proposed Solar Installations

- **Rooftop Solar Panels:** Mounted on non-historic ancillary structures like ticket booths, security offices, toilets, and visitor centers
- **Solar Carports:** Shaded parking with solar panels can provide dual benefits-vehicle protection and power generation
- **Standalone Solar Lights:** For pathways, trails, and around the minaret and tank perimeter to improve night-time safety and ambiance
- **Off-grid Solar Power Backup:** For CCTV surveillance, water pumps, and signage lighting, especially in remote or forested parts of the site

#### 5.6.5. Site Integration Strategy

- **Minimal Visual Impact:** Solar panels will be installed on modern structures, ensuring no intrusion on the heritage fabric
- **Smart Monitoring System:** A digital display at the visitor center can show live energy savings and educate tourists on sustainability
- **Capacity Estimation:** An initial 25–50 kW system can cover essential lighting, visitor services, and operations. The system can be expanded as site demand grows

#### 5.6.6. Environmental & Educational Benefits

- Reduces CO<sub>2</sub> emissions and dependence on fossil fuels
- Supports climate resilience goals for heritage conservation
- Opportunity to promote environmental awareness through signage and interactive exhibits on solar technology

#### 5.6.7. Partnerships & Funding

- Engage with public-private partnerships, such as with the **Punjab Energy Department, Heritage and Museum Departments**, and **international donors** like UNESCO or the Aga Khan Trust for Culture
- Explore CSR partnerships with solar companies or green tech organizations
- Apply for green energy development funds from national or international bodies

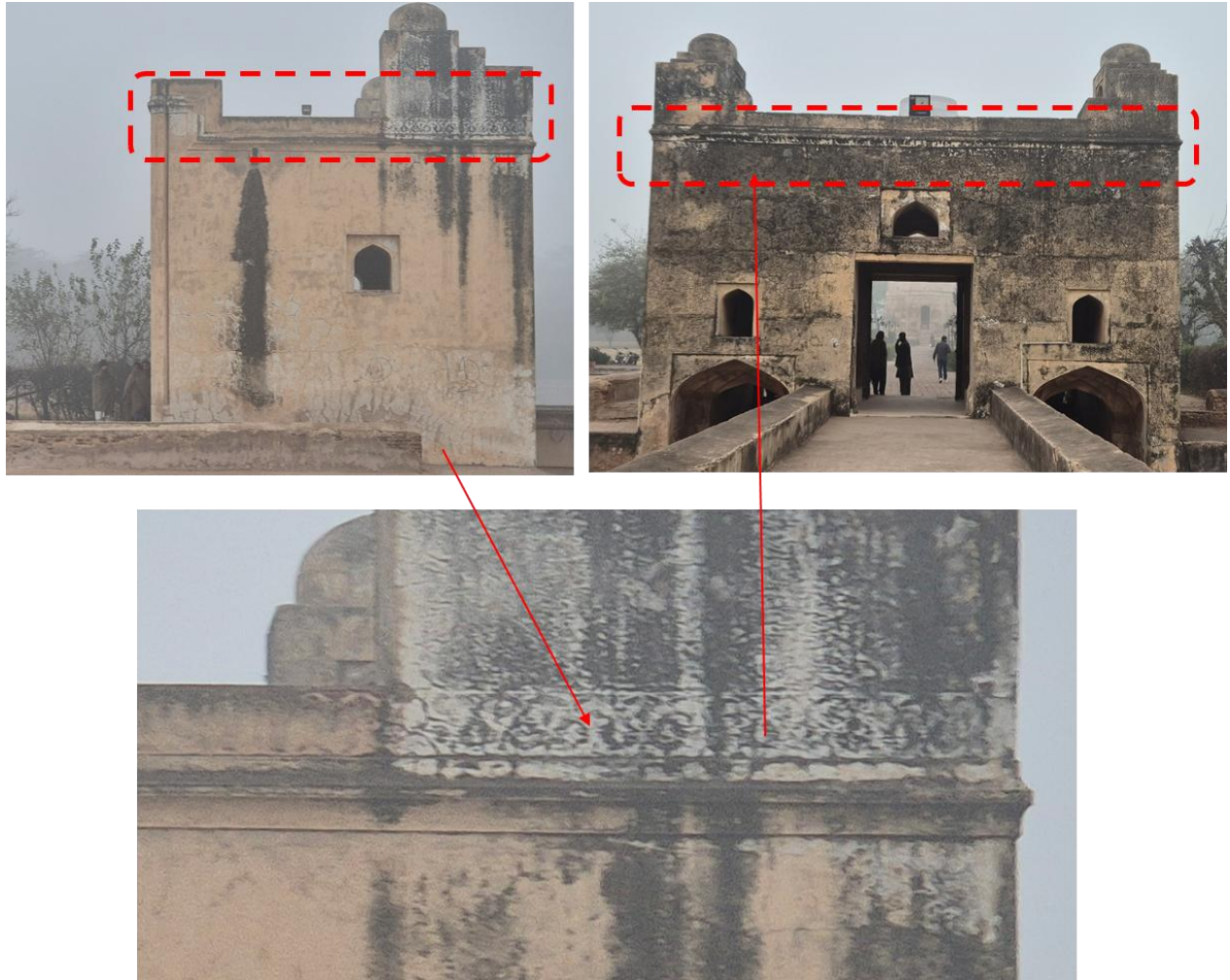
#### 5.6.8. Conclusion

Transforming Hiran Minar into an energy-efficient, solar-powered heritage site will not only preserve the legacy of Emperor Jahangir's era but also reflect his love for nature through modern sustainable practices. This initiative will position Hiran Minar as a leading example of eco-heritage tourism in Pakistan and contribute meaningfully to climate-conscious cultural conservation.

## 5.7. Hiran Minar Restoration Proposal

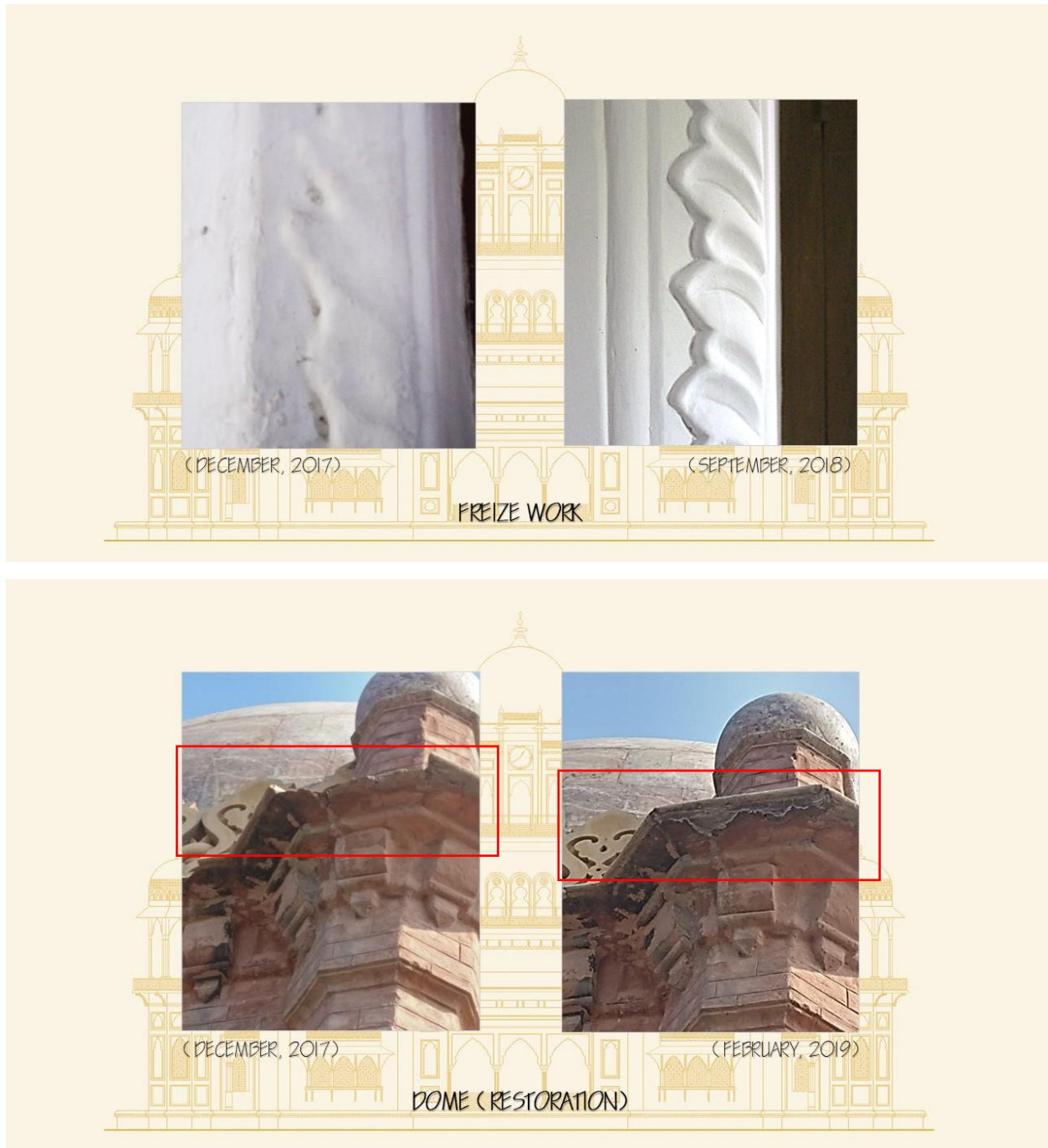
A lot of conservation efforts and successful strategies have been applied in Hiran Minar to conserve, preserve the central octagonal pavilion and the water body four-sided structure; however, the site offers much more than just the central architecturally built structure.

- The minaret with the grave of Deer, Mansrai, needs attention for conservation.
- Minaret octagonal enclosure
- Gateway to the Water pavilion



**Figure 18:** Existing condition of Hiran Minar

### 5.7.1. Reference for Restoration works completed in similar historic project of Old Building, Aitchison



**Figure 19:** Restoration works at Aitchison College completed in 2018

Clear demarcation of old material blending in with new material to maintain authenticity of the original, it is important to match the attributes of color, texture of new renovations with original structure but also to highlight the restored part so that the original building does not lose its character.

Historically and globally, the historical ruins are cherished now, romanticized, and incorporated in art, urban squares, and the natural environment as they add to the layers of urban infrastructure. Various famous public squares in London are built around the ruins of churches or other historical buildings.



**Figure 20:** Ruins of Taormina, Thomas Cole, 1842

St. Alphage's Church ruins incorporated in the urban landscape are just one of the examples as depicted below.



It is important to reconsider the approach towards urban ruins and instead to beautify everything that eventually loses the true soul of a space. It is important to preserve, naturally develop around it, and let history blend in the contemporary world.

A similar approach is required for the Minaret and Mansaraj grave in Hiran Minar.



**Figure 21:** Existing condition of Hiran Minar

## 5.8. Adaptive Re-use and Demolition of Abandoned Structures on-site

The new library, consisting of one conference room, reception, and two offices, is proposed to be re-planned and reused as an interactive Gallery to present the Mughal history, especially emperor Jahangir. This interactive gallery space with manuscripts from the *Jahangir Nama* and an audio-visual experience of the Mughal Empire story will be a huge, successful project, educating the visitor and engaging the public with their country and history.



**Figure 22:** Existing library

These abandoned structures, previously used as cafeterias to be cleared and demolished as new food stalls are planned to be placed in Zone A, and this space near the heritage site is to be food-free space.



**Figure 23:** Existing Prayer Areas

### 5.8.1. Improved signage on-site

The current signage on-site is in bad condition, and the descriptive signage of Hiran Minar is too long to engage a tourist with it who is visiting the site for a limited time. That is why the new master plan was developed to propose multiple signage to be placed and planned on-site, with information divided all over the site to keep the visitor engaged and curious throughout the visit. The concluding virtual gallery and viewing deck facilitate the tourists with visual/virtual information easy to comprehend and understand.



**Figure 24:** Existing signage

Short descriptive signage with a visual attracts the attention of visitors and makes it easy for them to grasp the information quickly.



**Figure 25:** Proposed signage at site

## 5.9. Zone A, Hiran Minar Master Plan

### 5.9.1. Tourist facilities and entertainment

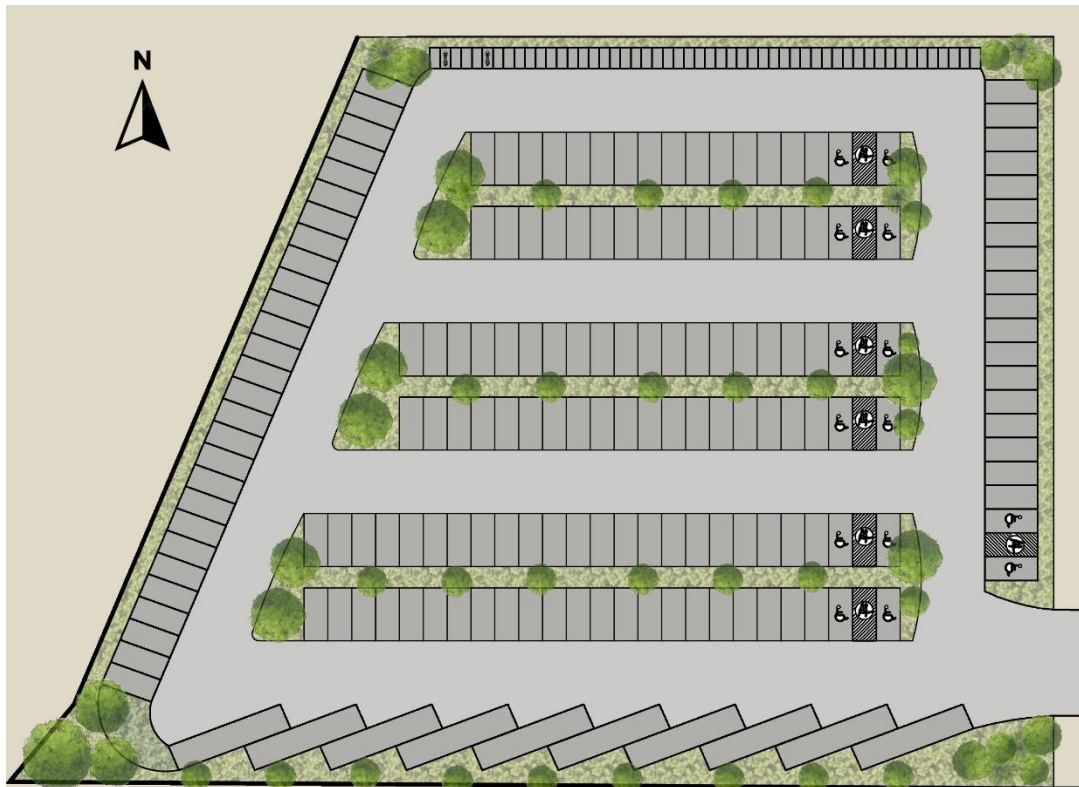
Zone A as described above is the entertainment and tourist facilities side of site that fulfills the requirement of any Tourist site including regular activities like Children Playground, Food Stalls, Car Park, In and out of the site, drop off lane, Toilets facility, Shaded areas for seating and Events related space for seasonal events like Spring festival, Eid Milan.



## 5.9.2. Car Parking

The proposed car parking has an organized approach towards parking protocols i.e.

- Designated 10 bus parking
- Designated motorcycle parking
- Designated handicap car parking
- Designated approximately 170 car parking



**Figure 27:** Proposed car parking conceptual design

## 5.9.3. Food stalls standardization

The food stalls provided are proposed to have a representation of the Punjab Government initiative. The stalls' structure will be provided by the government, and with further tendering procedure, the vendors will be selected on first come first-served basis to open their food eateries.

It is crucial to keep in mind the local community and home-based small entrepreneurship, especially by women in the communal living of Sheikhpura, to provide a platform in Hiran Minar to start their food business. In short, following two points should be kept in mind while engaging the local community of Sheikhpura.

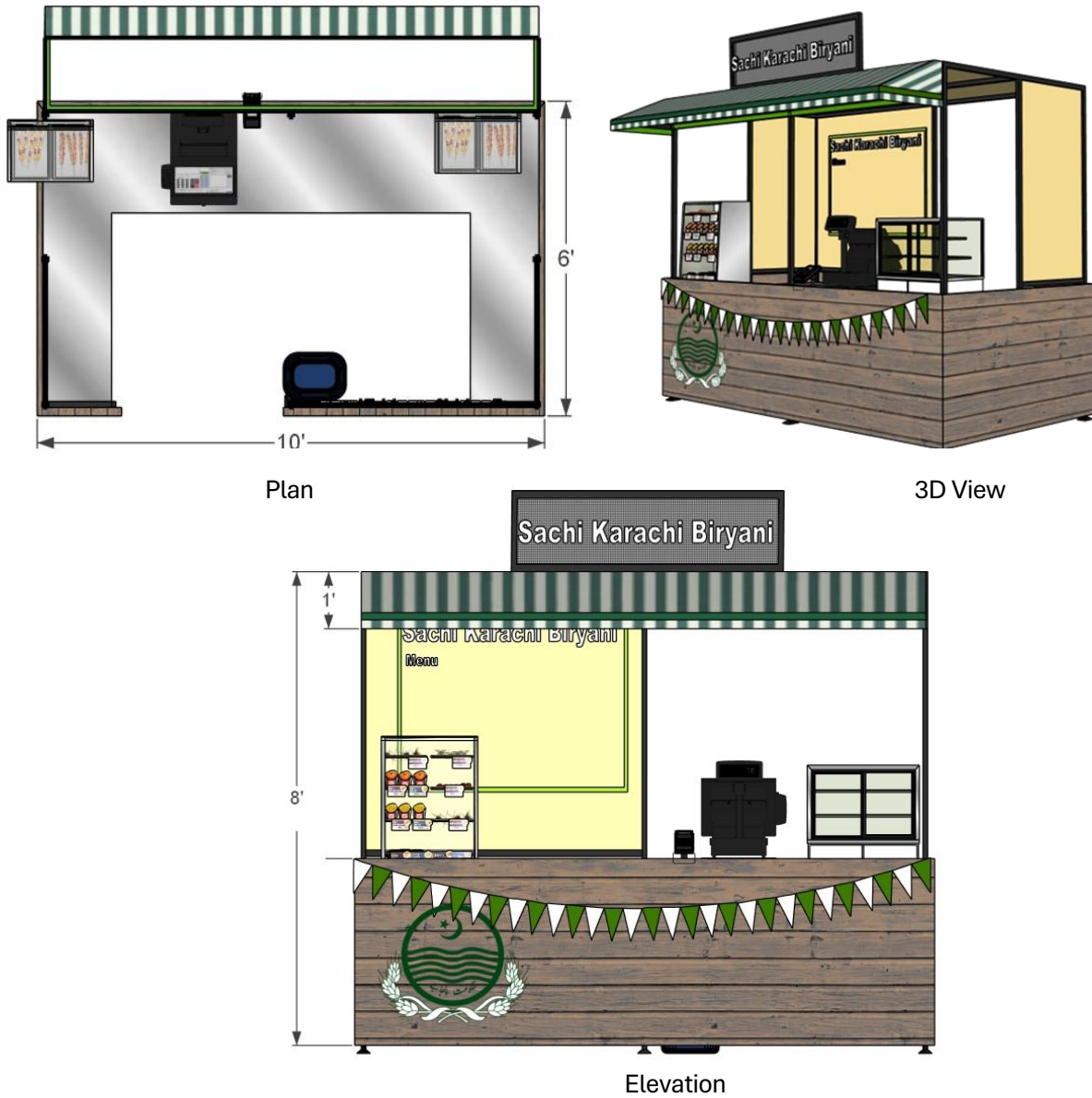
## 5.9.4. Small Business Opportunities on-site

- Allocate stalls to locals for:

- Souvenirs (handicrafts, postcards, books)
- Traditional food and beverages
- Eco-friendly products and bottled water
- Ensure stalls are aesthetically designed to blend with heritage context.

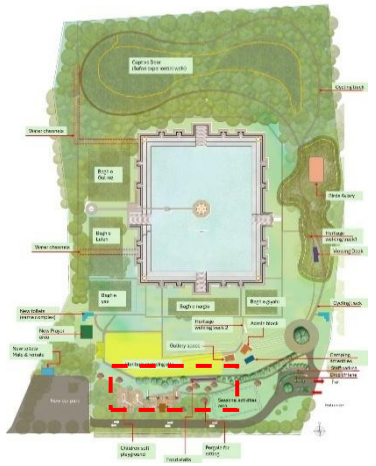
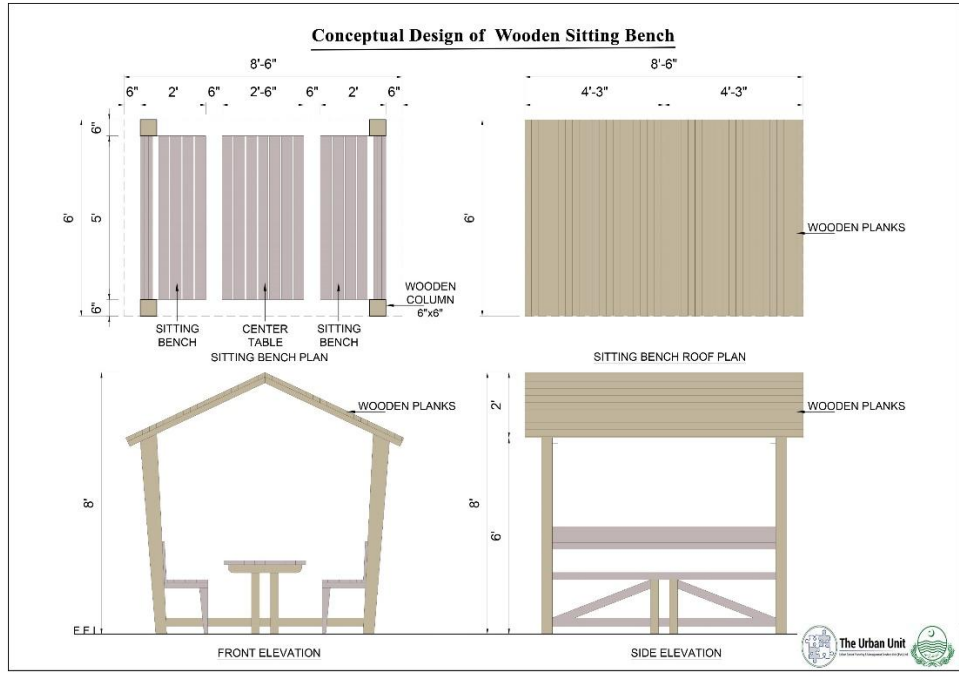
### 5.9.5. Women-led Enterprise Initiatives

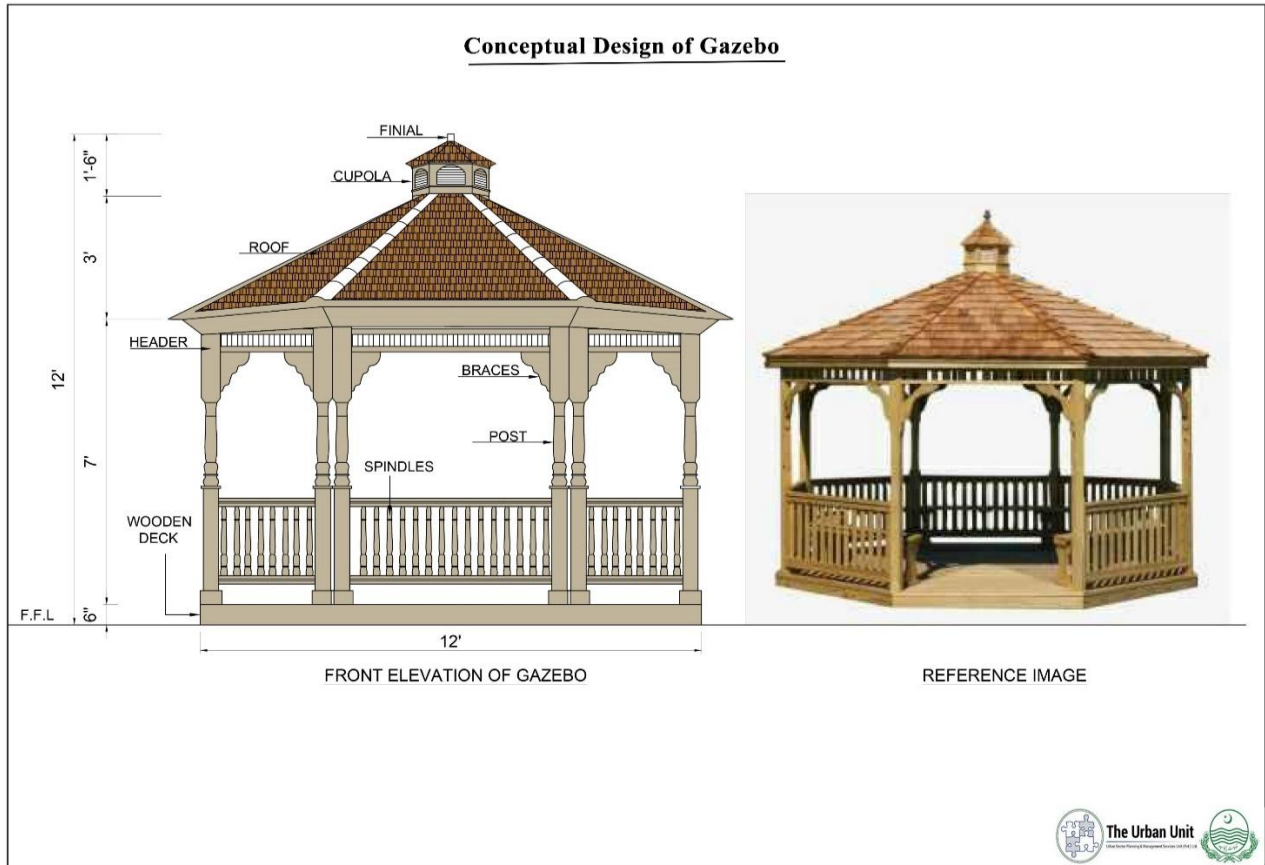
- Encourage local women to participate through crafts, textile products, or food items
- Provide micro-grants or partnerships with NGOs to build capacity



This simple yet effective kiosk design represents basic materials like raw treated wooden planks for front and side elevation, a color combination representing Pakistan, and logo of Punjab Govt. with a simple board on top defining the food stall category, menu on the flex sheet behind.

### 5.9.6. Picnic area around food stalls:

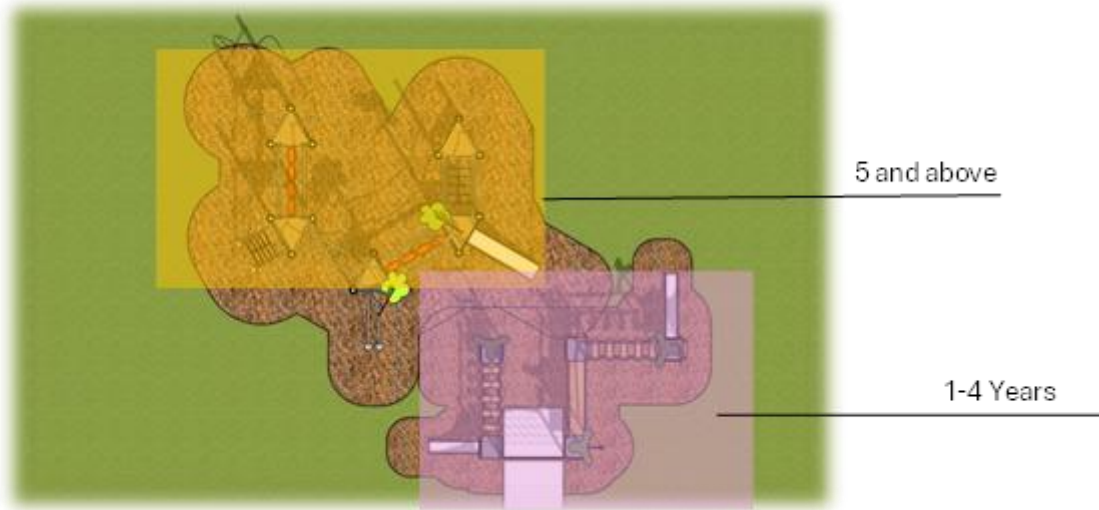




**Figure 28:** Conceptual design of Gazebos

### 5.9.7. Children’s Playground, Hiran Minar

The development of standardized children’s playgrounds can serve as a replicable model for public spaces across the region. This initiative aims to establish government-level guidelines for designing inclusive, safe, and educational play environments. The proposed standard will include age-appropriate zones, specifically designed play structures and equipment for children aged 1-4 and 5-9 years, focusing on developing motor skills, coordination, and cognitive growth through “learn and play” concept. Playground furniture will be selected to promote both active and imaginative play, encouraging social interaction and physical development. Additionally, a strong emphasis will be placed on child safety, recommending natural, impact-absorbing surfacing such as shredded wooden chips for all playground bedding. This guideline seeks to ensure consistency, safety, and developmental value in public playgrounds, making them vital components of community-oriented green spaces.





## Policy Brief: Standard Guidelines for Children's Playgrounds in Ecotourism and Urban Parks

### i. Policy Objective

To establish a set of national design and safety standards for children's playgrounds that promote physical activity, cognitive development, and environmental sensitivity, while ensuring safety and accessibility for all children

### ii. Key Components of the Proposed Standard

#### 1. Age-Specific Zoning

- Designated play zones for two primary age groups: 1-4 years and 5-9 years.
- Equipment scaled to appropriate sizes, motor skill levels, and risk tolerances for each group

#### 2. Developmental Design Principles

- Equipment and layouts that encourage gross and fine motor skills
- Features that promote imaginative play, problem-solving, and social interaction
- Integration of sensory play elements using natural textures and materials

#### 3. "Learn and Play" Concept

- Inclusion of educational elements such as interactive panels, nature facts, bird and plant identifiers, and storytelling features
- Design inspired by site-specific themes-for example, Mughal-inspired motifs in heritage sites like Hiran Minar

#### 4. Safety and Surface Standards

- All playgrounds to be surfaced with natural, impact-absorbing materials such as shredded wooden chips or certified rubber mulch.
- Clear sightlines for parental supervision and anti-climb fencing where necessary

- Compliance with international safety standards for fall zones and equipment spacing

#### **5. Environmental Integration**

- Use of sustainable materials and locally sourced, non-toxic finishes
- Shading through natural tree cover or sustainable shade structures
- Rainwater drainage and erosion control are considered in site planning

#### **6. Accessibility and Inclusion**

- Equipment and routes are designed to be inclusive of children with physical and sensory disabilities.
- Ground-level play elements, tactile pathways, and accessible seating areas.

#### **iii. Implementation Strategy**

- Develop a model playground in a pilot ecotourism site (e.g., Changa Manga) as proof of concept
- Establish an interdepartmental task force involving tourism, local government, child welfare, and landscape design experts
- Provide training and awareness workshops for municipal planners and contractors
- Allocate annual budgets and integrate these guidelines into future park developments and urban renewal schemes

#### **iv. Conclusion**

Standardizing public children’s playgrounds across ecotourism and urban park sites ensures equitable access to safe and enriching play environments for all children. By adopting this policy, the government can set a precedent for child-centered public space planning while reinforcing cultural narratives and environmental stewardship in its recreational landscapes.

#### **v. Safety and Security on-site:**

To ensure a safe and family-friendly environment at Hiran Minar site, comprehensive security measures are proposed as part of the development plan. Trained guards will be strategically stationed across key locations, including the entrance, visitor nodes, and along the heritage trail, with a dedicated security presence on the minaret for enhanced surveillance. Watch towers will be integrated within the deer safari zone to monitor activity, safeguard wildlife, and ensure guest safety. Additionally, security cameras will be installed throughout the site to support continuous monitoring, while solar-powered light poles will enhance visibility during evening hours, contributing to both safety and sustainability.

# 6. Proposed Project Stages and Costing

The Hiran Minar Master Plan project is designed to be divided into three stages:

## 6.1. Project Stages

### 6.1.1. Short Term Plan

- Preservation of the water canal system, including all the channels and slope gateways to fresh freshwater tank
- Landscape restoration
- Zone A development, including car park and tourist facilities
- Night illumination
- Thinning of the forest and clearing the site
- Development of viewing deck
- Adaptive re-use of the library building
- Master Plan experiential design including deer safari, birds' aviary

### 6.1.2. Medium Term Plan

- Conservation efforts of architectural details and Mughal structures like the Minaret, gate, and grave.

### 6.1.3. Long-term Plan

- Installation of Solar panel array and focusing on Hiran Minar site to become a net-zero carbon heritage site as a global example

## 6.2. Proposed Project Costing

| Summary of Rough Cost Estimate |   |               |                    |         |
|--------------------------------|---|---------------|--------------------|---------|
| Sr. No.                        | Description   | Amount in PKR | Amount in Millions | Remarks |
| <b>Short Term Plan</b>         |   |               |                    |         |
| 1                              | Construction of Flower Gardens in Hiran Minar Master Plan | 16,052,576.00 | 16.053             |         |
| 2                              | Landscape Restoration                                     | 20,000,000.00 | 20.000             |         |
| 3                              | Construction of Birds Aviary                              | 3,918,000.00  | 3.918              |         |
| 4                              | Construction of Deer Walking Safari Experience            | 25,222,200.00 | 25.222             |         |
| 5                              | Construction of Designated Parking Facility               | 9,685,435.04  | 9.685              |         |
| 6                              | Construction of Viewing Deck                              | 1,500,000.00  | 1.500              |         |

|  |   |                       |               |  |
|--|---|-----------------------|---------------|--|
| 7  | Construction of Bicycle Track   | 3,560,000.00          | 3.560         |  |
| 8  | Construction of Heritage Walks  | 3,767,000.00          | 3.767         |  |
| 9  | Construction of a Virtual gallery of Hiran Minar history  | 1,730,000.00          | 1.730         |  |
| 10   | Construction of Heritage Camping, Hiran Minar   | 1,910,000.00          | 1.910         |  |
| 11   | Construction of Toilets Blocks (Male and Female)  | 1,755,419.86          | 1.755         |  |
| 12   | Construction of New Praying Area  | 4,266,500.00          | 4.267         |  |
| 13   | Construction of Children's Soft Playground  | 7,725,412.00          | 7.725         |  |
| 14   | Construction of Food Stalls   | 681,000.00            | 0.681         |  |
| 15   | Construction of a Seasonal event place like Spring  | 2,000,000.00          | 2.000         |  |
| 16   | Construction of Family Picnic Area  | 405,862.50            | 0.406         |  |
| 17   | Construction of Boardwalk and Shops Front   | 7,664,513.00          | 7.665         |  |
| 18   | Heritage Illumination Strategy  | 2,856,000.00          | 2.856         |  |
|  | <b>a) Total Amount of Short-Term Plan</b>   | <b>114,699,918.40</b> | <b>114.70</b> |  |
| <b>Medium Term Plan</b>  |   |                       |               |  |
| 1  | Conservation efforts of architectural details and Mughal structures like the Minaret, gate, and grave                             | 117,430,000.00        | 117.430       |  |
|  | <b>b) Total Amount of Medium-Term Plan</b>  | <b>117,430,000.00</b> | <b>117.43</b> |  |
| <b>Long Term Plan</b>  |   |                       |               |  |
| 1  | Installation of Solar panel array and focusing on Hiran Minar site to make it a net-zero carbon heritage site as a global example | 4,235,000.00          | 4.235         |  |
|  | <b>c) Total Amount of Long-Term Plan</b>  | <b>4,235,000.00</b>   | <b>4.24</b>   |  |
|  | <b>(a+b+c) Sub-Total Amount</b>   | <b>236,364,918.40</b> | <b>236.36</b> |  |
|  | <b>Add Contingencies Cost (2.5%)</b>  | <b>5,909,122.96</b>   | <b>5.91</b>   |  |
|  | <b>Add PST (5%)</b>   | <b>11,818,245.92</b>  | <b>11.82</b>  |  |
|  | <b>Grand Total Amount with Contingencies and PST</b>  | <b>254,092,287.28</b> | <b>254</b>    |  |
| <b>COST:-</b>  |   |                       |               |  |
| The Total Rough Cost Estimate has been worked out amounting to <b>Rs. 254 million</b> , including 2.5% Contingencies & 5% PST. |   |                       |               |  |

## 6.2.1. Detail Costing

### Rough Cost Estimates of Flower Garden:

| MRS, 1st BI-ANNUAL-2025 (01.01.2025 to 30.06.2025) DISTRICT SHEIKHUPURA |             |      |     |            |  |
|---|-------------|------|-----|------------|--|
|   | Description | Unit | Qty | Rate (Rs.) |  |

| Item No.   |   |          |            |           | Amount (Rs.)     |
|------------|---|----------|------------|-----------|------------------|
| <b>1.0</b> | <b>Soil Preparation.</b>  |          |            |           |                  |
| 1.0        | Supply of Canal Silt  | 1000 Cft | 414,612.00 | 2,000.00  | 829,224          |
| 1.1        | Supplying of Sweet Soil   | 1000 Cft | 207,306.00 | 1,200.00  | 2,487,672        |
|            | <b>SUB TOTAL. (Soil Preparation)</b>  |          |            |           | <b>3,316,896</b> |
| <b>2.0</b> | <b>Fertilizer &amp; Pesticides.</b>   |          |            |           |                  |
| 2.1        | Supplying of Sweet Soil   | Bag      | 100.00     | 3,240.00  | 324,000          |
| 2.2        | Supply of Urea  | Bag      | 100.00     | 5,000.00  | 500,000          |
| 2.3        | Supply of DAP   | Bag      | 100.00     | 12,500.00 | 1,250,000        |
| 2.4        | Supply of Cow Manure  | Bag      | 100,000.00 | 8.00      | 800,000          |
| 2.5        | Supplying of Termiticides & Pesticides  | Liters   | 100.00     | 1,800.00  | 180,000          |
|            | <b>SUB TOTAL. (Fertilizer &amp; Pesticides)</b>   |          |            |           | <b>3,054,000</b> |
| <b>3.0</b> | <b>Plantation.</b>  |          |            |           |                  |
| 3.1        | Turfing Grass   | Sft.     | 138,204.00 | 45.00     | 6,219,180        |
| 3.2        | Roses (Gul)   | Each     |            | 350.00    |                  |
| 3.3        | Tulips  | Each     |            | 750.00    |                  |
| 3.4        | Lotus (Kamal)   | Each     |            | 750.00    |                  |
| 3.5        | Marigold (Genda)  | Each     |            | 350.00    |                  |
| 3.6        | Jasmine (Chameli/Mogra)   | Each     |            | 1,050.00  |                  |
| 3.7        | Narcissus (Nargis)  | Each     |            | 470.00    |                  |
| 3.8        | Lilies (Sosan)  | Each     |            | 5,500.00  |                  |
| 3.9        | Cypress Trees (Sarv)  | L.S      |            |           | 500,000          |
| 3.1        | Supplying of Large Size Ornamental Trees (Foliage & Flowering)  |          |            |           |                  |
| i)         | Amaltas, Jacoranda, Magnolia, Goldmohr, Dhak, Katchnar, Palms, etc                                      | L.S      | -          | -         | 500,000          |
| ii)        | Ornamental Shrubs (Large Size) Chandni, Chandna, Hibiscus, Tecoma, Jatropha, Murva, Lagerstroemia, etc. | L.S      | -          | -         | 367,500          |
| iii)       | Climbers (Bougainvillea, etc.)  | L.S      | -          | -         | 595,000          |
| iv)        | Perennial Flowering Plants / Ground Cover (Duranta, Nanthra, Euphorbia, Vinca, Jerbara, etc.)           | L.S      | -          | -         | 200,000          |
| v)         | Annual Flowering Plants (Marigold, Petunia, Jafri, Pency, Anthurium, etc.)                              | L.S      | -          | -         | 300,000          |
|            | <b>SUB TOTAL. (Plantation)</b>  |          |            |           | <b>8,681,680</b> |

|                              |                             |     |      |              |                   |
|------------------------------|-----------------------------|-----|------|--------------|-------------------|
| <b>4.0</b>                   | <b>Plantation.</b>          |     |      |              |                   |
| 4.1                          | Pathway                     | L.S | 1.00 | 1,000,000.00 | 1,000,000         |
|                              | <b>SUB TOTAL. (Pathway)</b> |     |      |              | <b>1,000,000</b>  |
| <b>GRAND TOTAL. (1 to 3)</b> |                             |     |      |              | <b>16,052,576</b> |

#### Rough Cost Estimates of Bird Aviary:

| Item Description                           | Unit     | Quantity | Rate (PKR) | Total (PKR)         | Remarks |
|--|----------|----------|------------|---------------------|---------|
| <b>1. Site Preparation</b>                 |          |          |            |                     |         |
| Site clearing and grading                  | Sq. Ft.  | 6700     | 30.00      | 201,000.00          |         |
| <b>2. Foundation and Structure</b>         |          |          |            |                     |         |
| Concrete for footings                      | Cu. Yd.  | 30       | 7,000.00   | 210,000.00          |         |
| Steel structure (rails, frames)            | Kg       | 1500     | 310.00     | 465,000.00          |         |
| <b>3. Walls and Roofing</b>                |          |          |            |                     |         |
| Bird-proof mesh (walls)                    | Sq. Ft.  | 6700     | 150.00     | 1,005,000.00        |         |
| Roofing (shade cloth or polycarbonate)     | Sq. Ft.  | 6700     | 160.00     | 1,072,000.00        |         |
| <b>4. Flooring</b>                         |          |          |            |                     |         |
| Ground cover (natural soil)                | Cu. Ft.  | 10000    | 10.00      | 100,000.00          |         |
| <b>5. Water Features</b>                   |          |          |            |                     |         |
| Small pond/water fountain                  | Each     | 1        | 125,000.00 | 125,000.00          |         |
| <b>6. Feeding and Perching Structures</b>  |          |          |            |                     |         |
| Wooden or metal perches                    | Each     | 10       | 12,000.00  | 120,000.00          |         |
| Feeding stations                           | Each     | 5        | 14,000.00  | 70,000.00           |         |
| <b>7. Electricity and Lighting</b>         |          |          |            |                     |         |
| LED fixtures for lighting                  | Each     | 10       | 2,500.00   | 25,000.00           |         |
| Electrical wiring & installation           | Lump Sum | 1        | 15,000.00  | 15,000.00           |         |
| <b>8. Landscaping and Surrounding Area</b> |          |          |            |                     |         |
| Native plants (trees/shrubs)               | Each     | 20       | 3,000.00   | 60,000.00           |         |
| Pathway installation (gravel, etc.)        | Sq. Ft.  | 1000     | 150.00     | 150,000.00          |         |
| <b>9. Labor Costs</b>                      |          |          |            |                     |         |
| Estimated labor costs                      | Lump Sum | 1        | 300,000.00 | 300,000.00          |         |
| <b>TOTAL</b>                               |          |          |            | <b>3,918,000.00</b> |         |

#### Rough Cost Estimates of Deer Safari:

| Item Description                           | Unit       | Quantity   | Rate (PKR) | Total (PKR)          |
|--|------------|------------|------------|----------------------|
| <b>1. Site Preparation</b>                 |            |            |            |                      |
| Site clearing and grading                  | Sq. Ft.    | 304,920.00 | 20.00      | 6,098,400.00         |
| Soil treatment and leveling                | Sq. Ft.    | 304,920.00 | 15.00      | 4,573,800.00         |
| <b>2. Fencing and Security</b>             |            |            |            |                      |
| Perimeter fencing (chain-link or similar)  | Linear Ft. | 3,600.00   | 350.00     | 1,260,000.00         |
| Wildlife barrier fencing                   | Linear Ft. | 1,200.00   | 750.00     | 900,000.00           |
| <b>3. Enclosures for Deer</b>              |            |            |            |                      |
| Enclosure construction (including shelter) | Sq. Ft.    | 10,000.00  | 300.00     | 3,000,000.00         |
| Water troughs (for each enclosure)         | Each       | 10.00      | 10,000.00  | 100,000.00           |
| <b>4. Visitor Facilities</b>               |            |            |            |                      |
| Reception area construction                | Sq. Ft.    | 800.00     | 1,250.00   | 1,000,000.00         |
| Restroom facilities                        | Each       | 2.00       | 100,000.00 | 200,000.00           |
| Parking area preparation                   | Sq. Ft.    | 20,000.00  | 25.00      | 500,000.00           |
| <b>5. Pathways and Trails</b>              |            |            |            |                      |
| Pathway construction (gravel)              | Sq. Ft.    | 20,000.00  | 150.00     | 3,000,000.00         |
| <b>6. Landscaping</b>                      |            |            |            |                      |
| Native flora planting (trees/shrubs)       | Each       | 200.00     | 500.00     | 100,000.00           |
| Grass seeding/sod for open areas           | Sq. Ft.    | 100,000.00 | 32.00      | 3,200,000.00         |
| <b>7. Water Supply and Utilities</b>       |            |            |            |                      |
| Borewell installation (if required)        | Each       | 1.00       | 100,000.00 | 100,000.00           |
| Water supply infrastructure                | Lump Sum   | 1.00       | 50,000.00  | 50,000.00            |
| <b>8. Electricity and Lighting</b>         |            |            |            |                      |
| Electric supply installation               | Lump Sum   | 1.00       | 150,000.00 | 150,000.00           |
| Solar lights for pathways                  | Each       | 30.00      | 13,000.00  | 390,000.00           |
| <b>9. Labor Costs</b>                      |            |            |            |                      |
| Estimated labor costs                      | Lump Sum   | 1.00       | 600,000.00 | 600,000.00           |
| <b>TOTAL</b>                               |            |            |            | <b>25,222,200.00</b> |

#### Rough Cost Estimates of Deer Safari:

| Mrs Ref# | Item No. | Description | Unit | Rate (PKR)* | As Per Qty |               |
|----------|----------|-------------|------|-------------|------------|---------------|
|          |          |             |      |             | Qty        | Amount (PKR)* |

|             |   |  |         |           |          |            |
|-------------|---|--|---------|-----------|----------|------------|
| 3/21-2-a-ii | 1 | Excavation in foundation of buildings, bridges, and other structures, including Dag belling, dressing, refilling around structure with excavated earth, watering, and ramming lead up to one chain (30 m) and lift to 5 ft. (1.5 m) 2) a) By Excavator ii) Ordinary soil   | %Cft    | 10,639.90 | 4,951.25 | 52,680.80  |
| 6/5(i)      | 2 | Cement concrete plain, including placing, compacting, finishing, and curing complete (including screening and washing of stone aggregate): (nominal mix 1: 4: 8)   | %Cft    | 37,516.70 | 305.51   | 114,615.84 |
| 6/6 a-II-3  | 3 | Reinforced cement concrete in slab of rafts/strip foundation, base slab of column, and retaining walls, etc, and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e., horizontal shuttering) complete in all respects: -   |         |           |          | -          |
|             |   | Slab of rafts/strip foundation, base slab<br>Type C (nominal mix 1: 2: 4)  | Per Cft | 620.30    | 173.81   | 107,811.99 |
| 7/4-i)      | 4 | Pacca brick work in foundation and plinth in: -<br>Cement, sand, mortar:-  |         |           | -        | -          |
|             |   | Ratio 1:5  | %Cft    | 37,056.40 | 594.15   | 220,170.60 |
| 7/5-i)      | 5 | Pacca brick work in the ground floor: -  |         |           | -        |            |
|             |   | Ratio 1:5  | %Cft    | 38,000.20 | 561.90   | 213,523.12 |
| 6/13-b      | 6 | Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labor charges for binding of steel reinforcement (also includes removal of rust from bars):- |         |           |          |            |
|             |   | Deformed bars (Grade-60)   | %Kg     | 30,310.05 | 434.52   | 131,701.87 |

|              |    |   |         |           |          |            |
|--------------|----|---|---------|-----------|----------|------------|
| 6/38(b)      | 7  | Providing and laying damp proof course of cement concrete 1:2:4(using cement, sand and shingle), including bitumen coating: -<br>b) with 2 coats of bitumen:<br>ii) 2" thick (50 mm)  | %Sft    | 9,381.85  | 59.42    | 5,574.23   |
| 6/39 (a-III) | 8  | Providing and laying a damp proof course with cement, sand plaster, and bitumen coating: -<br>iii) Ratio 1:2<br>b) ¾ " thick (20 mm)  | %Sft    | 9,451.45  | 118.83   | 11,231.16  |
| 11/9-b       | 9  | Cement plaster 1:4 up to 20' (6.00 m) height: - ½" (13 mm) thick  | %Sft    | 4,618.45  | 1,877.76 | 86,723.52  |
| 3/15+18      | 10 | Filling, watering, and ramming earth under floors: -<br>ii) With the new earth excavated from outside, lead up to one chain (30 m).<br>Dressing and levelling of earthwork to the designed section, etc<br>a) Ashes, sand, silt, or soft soil   | %0Cft   | 16,964.65 | 840.91   | 14,265.68  |
| 10/4         | 11 | Providing, laying, watering, and ramming brick ballast 1½" to 2"(40 mm to 50 mm) gauge mixed with 25% sand, for floor foundation, complete in all respects  | %Cft    | 13,251.20 | 84.09    | 11,143.01  |
| 12/7         | 12 | First class deodar wood wrought joinery in doors and windows etc. panelled, or panelled or glazed, or fully glazed, fixed in position, including chowkat, holdfast, hinges, tower bolts, chocks, robber stop, cleats/ G.I, clamps, handles and chord with hooks etc. complete (excluding sliding bolts or lock):-a) 2" thick (50mm) | Per Sft | 3,759.70  | 35.00    | 131,589.50 |

|                      |    |  |         |           |          |           |
|----------------------|----|--|---------|-----------|----------|-----------|
| 25/53                | 13 | Supply and fix with fly screen shutters black anodized aluminum sliding windows of ALCOP or approved equivalent including anodized Aluminum frames, aluminum screws and bolts poly propylene weather seals pewter handles 5 mm thick plain sheet glass glazing neoprene gaskets 25 mm x 12 mm anodized aluminum square beads, silicone sealant pointing around all edges as per specification and drawings complete. | Per Sft | 330.05    | 8.00     | 2,640.40  |
| 11/22+23             | 14 | Distempering: -<br>a) new surface: -<br>iii) three coats   | %Sft    | 2,041.25  | 1,877.76 | 38,329.82 |
| 13/7                 | 15 | French polishing complete: -<br>doors<br>a) on new work  | %Sft    | 3,846.55  | 70.00    | 2,692.59  |
| 9/5+12 & 26/37       | 16 | First class Single layer of brick tiles 9"x4½"x1½" (225x113x40 mm) laid over 4"(100 mm) earth and 1" (25 mm) mud plaster without Bhoosa, grouted with cement sand 1:3 on top of RCC roof slab, provided with two coats of 34 lbs. per %Sft. or 1.72 Kg/Sq.m bitumen coating sand blinded with a 0.2mm thick polythene sheet. complete in all respects as per drawings and specifications, including curing, etc.     | %Sft    | 10,148.35 | 336.36   | 34,135.23 |
| <b>Roof Drainage</b> |    |  |         |           |          |           |
| N.s                  | 19 | Supply, provide, and fix in position UPVC rainwater downpipe lines conforming to ISO 3633:1991 and BS 3505 1968 (wall thickness 3.2mm), including proper joints complete in all respects, and system leak-free:<br>a) 4" dia   | Rft     | 388.40    | 50.00    | 19,420.00 |
| N.s                  | 20 | Provide and fix UPVC plain bends with grating (as rain water inlets  |         |           |          |           |

|     |    |  |     |          |        |           |
|-----|----|--|-----|----------|--------|-----------|
|     |    | at the roof), water-tight connection, leak-free:   |     |          |        |           |
|     |    | a) 4" dia  | No  | 1,240.00 | 2.00   | 2,480.00  |
| N.s | 21 | Provide and fix UPVC shoe bends (as rain water outlets), water-tight connection, leak-free:  |     |          |        |           |
|     |    | a) 4" dia  | No  | 1,428.00 | 2.00   | 2,856.00  |
| N.s | 22 | Provide and lay rain water troughs on the roof using cement concrete 1:2:4 and finish with 1/2" thick 1:3 in grey cement sand plaster with waterproof agent as per Specifications, whole system leak-free:   |     |          |        |           |
|     |    | a) 1'-6" x 1'-6"   | No  | 1,000.00 | 2.00   | 2,000.00  |
|     |    | <b>Tile Work</b>   |     |          |        |           |
| N.s | 24 | Provide and lay non-skid ceramic tiles FLOORING of approved manufacturer, laid in 19mm thick 1:3 cement sand mortar bed under-coat and 300mm x 300mm best quality, high finish, imported tiles approved by the Engineer, including filling joints with white cement and matching pigment, complete in all respects as per drawings and Specifications and as per sample approved by the Engineer | Sft | 279.00   | 168.00 | 46,872.00 |
| N.s | 25 | Provide and lay DADO TILES non-skid ceramic tiles 400mm x 400mm, best quality, high finish, imported tiles approved by the Engineer in the flooring as specified areas, complete in all respects as per drawings and Specifications and as per sample approved by the Engineer   | Sft | 141.00   | 108.00 | 15,228.00 |
|     |    | <b>PUBLIC HEALTH WORKS</b>   |     |          |        |           |
| N.s | 26 | Pre-polished Lasbela Marbles slab 3/4" thick of approved quality color, shade, and texture of Lab/ Kitchen counter top set over 3/4" thick 1:3 cement sand mortar, i/c beveling of exposed edges and   | Sft | 280.00   | 54.00  | 15,120.00 |

|                 |    |   |     |     |        |           |
|-----------------|----|---|-----|-----|--------|-----------|
|                 |    | filling of joints grouted with white cement mixed with pigment  |     |     |        |           |
| N.s             | 27 | Provide, lay and fix Polypropylene Random Co-polymer (PPRC) pipes of Grade PN-20 conforming to DIN standard of 8077 / 8078 made by "Dadex" or approved equivalent for hot and cold water supply lines with specials and fittings according to DIN standard of 16962 / PN-25 including cutting, jointing, and testing as per Manufacturer's Specifications, supported on walls or run in chases or under floors including pipe hangers, supports, making requisite number of holes where required and making good the holes and chases, complete |     |     |        | -         |
|                 |    | a) 20 mm outside diameter   | Rft | 85  | 100.00 | 8,500.00  |
|                 |    | b) 25 mm outside diameter   | Rft | 125 | 120.00 | 15,000.00 |
| N.s             | 28 | Provide, fix, join and test BSS 1387 medium quality G.I. pipes for cold water supply "IIL" or "Jamal" make and China make specials (sockets, tees, elbows, bends, crosses, reducers, plugs and union etc.) burried in floor including encasement 1:2:4 ratio with 8 #3 dia steel rebars grade-60 and strips #3 @200 c/c including P.C.C. 1:4:8 in lean concrete, formwork and its removal, excavation, backfill etc; complete   |     |     |        | -         |
|                 |    | a) 20 mm outside diameter   | Rft | 105 | 100.00 | 10,500.00 |
| Ch: -<br>19/30  | 29 | Providing and fixing gun metal peat/gate valve (screwed): -   |     |     |        | -         |
|                 |    | a) 30mm dia   | No. | 465 | 2.00   | 929.40    |
| Ch: -<br>19/6-i | 30 | Providing and fitting a glazed earthenware wash hand basin 56x40 cm (22"x16") including bracket set, waste pipe, and waste coupling, etc.   |     |     |        | -         |

|                  |    |   |      |          |        |           |
|------------------|----|---|------|----------|--------|-----------|
|                  |    | white, with pedestal  | No.  | 2,779    | 2.00   | 5,557.50  |
| N.s              |    | Providing and fitting an English commode  | Each | 6,870.00 | 2.00   | 13,740.00 |
| N.s              |    | Providing and fitting an Indian commode   | Each | 1,275.00 | 2.00   | 2,550.00  |
| Ch:-<br>19/34-ii |    | Providing and fitting "P" trap:-  |      |          |        |           |
|                  |    | ii) 10 cm (4") glazed.  | Each | 175      | 2.00   | 349.00    |
| Ch:-<br>19/11-i  |    | Providing and fitting glazed earthenware low-down flushing cistern 13.63 litres (3 gallons) capacity, including bracket set, copper connection, etc.  |      |          |        |           |
|                  |    | i) white  | Each | 2,236    | 2.00   | 4,472.30  |
| N.s              | 34 | Provide and fix Towel Rail NO.2005 Model of M/s Master make or approved equal fixed with rawl plugs and C.P. brass screws as per sample approved, complete  | No.  | 1,800    | 3.00   | 5,400.00  |
| N.s              | 35 | Provide and fix Soap Dish No. 2007 of Master make or approved equal to the sample approved.   | No.  | 1,500    | 3.00   | 4,500.00  |
| Ch:-<br>19/35    | 31 | Providing and fitting a 10cm (4") gully trap, including cement concrete, cost of PVC grating 15 x 15 cm (6"x 6"), and masonry chamber 30x30cm (12"x12")   | No.  | 771      | 2.00   | 1,541.60  |
| N.s              | 32 | Provide, cut, fix, join and test uPVC pipe for soil and waste conforming to ISO 3633:1991 (wall thickness =3.2mm) including uPVC fittings with solvent cement jointing "Dadex" make or approved equal, including clamping to walls or under floor, cutting through walls and providing sleeves through concrete for pipelines and pipe fittings including testing of the following diameter |      |          |        | -         |
|                  |    | a) 50mm dia   | Rft  | 250      | 100.00 | 25,000.00 |
|                  |    | b) 75 mm outside diameter   | Rft  | 300      | 70.00  | 21,000.00 |
| N.s              | 33 | Provide and fix UPVC Floor Trap "Dadex" make or approved  |      |          |        | -         |

|           |    |  |       |       |        |            |
|-----------|----|--|-------|-------|--------|------------|
|           |    | equivalent, including grating, and cover, as approved  |       |       |        |            |
|           |    | a) 50mm dia  | No.   | 500   | 4.00   | 2,000.00   |
|           |    | b) 75mm dia  | No.   | 800   | 4.00   | 3,200.00   |
| N.s       | 34 | Provide and fix UPVC Floor Clean out "Dadex": make or approve equal, including testing complete in all respects as per drawings.   |       |       |        | -          |
|           |    | a) 75mm dia  | No.   | 650   | 4.00   | 2,600.00   |
| N.s       | 35 | Provide and fix install a 500-gallon capacity roof water tank "Dura: or "Sun International Co. Pvt. Ltd., or approved equal, including all arrangement accessories, connections complete in all respects and as approved by the Engineer   | No.   | 8,000 | 4.00   | 32,000.00  |
| Ch:-21/1  | 36 | Providing and laying R.C.C pipe, molded with cement concrete 1:1½:3 with spigot or collar joint, etc, including cost of Reinforcement, confirming to B.S.S 5911, Part 1981, class "L", including lowering in trenches to correct alignment and grade, jointing, cutting of pipes where necessary, finishing and testing complete (9" dia pipe) | Rft   | 428   | 500.00 | 213,800.00 |
| N.s       | 37 | Construction of square masonry manhole (2'x2') including cover and frame = (Up to 6 ft depth )   | No.   | 4,500 | 10.00  | 45,000.00  |
|           |    | <b>Internal Electrification</b>  |       |       |        | -          |
| Ch:-24/3  | 38 | S/E of PVC pipe for wiring recessed in walls, i/c inspection boxes, hooks, cutting, repairing surface, etc. 20 mm  | P.Rft | 61.05 | 70.00  | 4,273.50   |
|           |    | 25 mm  | P.Rft | 70.5  | 50.00  | 3,525.00   |
|           |    | 32 mm  | P.Rft | 90    | 50.00  | 4,500.00   |
| Ch:-24/11 | 39 | Supplying and erection of single core cable, PVC insulated, etc.   |       |       |        | -          |
|           |    | 3/0.029"   | P.Rft | 13.65 | 45.00  | 614.25     |
|           |    | 7/0.029"   | P.Rft | 20.9  | 30.00  | 627.00     |

|                     |    |  |      |        |      |                     |
|---------------------|----|--|------|--------|------|---------------------|
| Ch:-<br>24/14       | 40 | Supply and erection of M.S. sheet box of 16 SWG, 10 cm (4") deep, with 4.75 mm thick (3/16") bakelite sheet top, for recessed wiring, including making holes for regulators, switches, plugs, etc. (10"x 10")                        | Each | 197.7  | 1.00 | 197.70              |
| Ch:-<br>24/27       | 41 | S/F of bottom holder Bracket, large size.  | Each | 67.75  | 5.00 | 338.75              |
| Ch:-<br>24/30       | 42 | S/E of switches 5 Amp Piano type   | Each | 46.9   | 5.00 | 234.50              |
| N.s                 | 43 | S/E of the ceiling Rose bracket.   | Each | 200    | 2.00 | 400.00              |
| Ch:-<br>24/36       | 44 | S/E of 3-pin switch and plug combine 5 Amp   | Each | 75.45  | 6.00 | 452.70              |
| Ch:-<br>24/36       | 45 | Supply and erection of 3-pin, 10/15 Amp. wall socket Recessed type   | Each | 106.75 | 5.00 | 533.75              |
| N.s                 | 46 | S/E of roof hook i/c M.S.box 7"x4"   | Each | 120    | 1.00 | 120.00              |
| Ch:-<br>24/26       | 47 | S/E of wall type/pole type bracket with double cover water-tight reflector.  | Each | 657.55 | 1.00 | 657.55              |
| N.s                 | 50 | S/E Downlighter 1x 12W LED Light (Smart Lights) as approved by the Electrical Engineer   | Each | 200    | 5.00 | 1,000.00            |
| N.s                 | 51 | Supply and installation of Single-Phase Meter complete in all respects as approved by the Electrical Engineer.   | Each | 2500   | 1.00 | 2,500.00            |
| N.s                 | 52 | S/E of Main Panel Board as shown in the Drawings.<br>Incoming 30 Amp Double Pole<br>1 No Voltmeter<br>1 No Amp Meter<br><b>Outgoing</b><br>8 Nos. 10 Amp Single Pole<br>Bus Bars 1 No Phase, 1 No Netural, & 1 No. Earth<br>Thimbles | Each | 35000  | 1.00 | 35,000.00           |
| <b>Total Amount</b> |    |  |      |        |      | <b>1,755,419.86</b> |

#### Rough Cost Estimates of Designated Parking:

**MRS, 1st BI-ANNUAL-2025 (01.01.2025 to 30.06.2025) DISTRICT SHEIKHUPURA**

**Drop off lane, Public parking, Staff parking and Separate entry exit**

| Mrs Ref          | Item No. | Description  | Unit      | Rate (PKR)*   | As Per Qty    |               |
|------------------|----------|--|-----------|---------------|---------------|---------------|
|                  |          |  |           |               | Qty           | Amount (PKR)* |
| 3/4+24<br>b+25-l | 1        | Borrowpit excavation undressed lead upto 100 ft (30 metre). Compaction of earthwork with power road roller, including ploughing, mixing, moistening earth to optimum moisture content in layers, etc., complete:<br>i)95% to 100% maximum modified AASHO dry density   | 0%<br>Cft | 14,013.6<br>0 | 16,140.0<br>0 | 226,179.50    |
| 18/3-<br>a(II)   | 2        | Providing and laying sub-base course of stone product of approved quality and grade, including placing, mixing, spreading, and compaction of sub-base material to required depth, camber, and grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to the site of work except gravel and aggregate   | % Cft     | 9,827.25      | 4,035.00      | 396,529.54    |
| 10/42-<br>c      | 3        | Providing and laying Tuff pavers, having 7000PSI, crushing strength of approved manufacturer, over 2"to 3" sand cushioning/grouting with sand in joints, i/c finishing to require slope. Complete in all respects. 60-mm thick.  | P.Sft     | 193.95        | 8,070.00      | 1,565,176.50  |
| 26/45            | 4        | Supply and Erection of Car Parking Shed consisting of 3mm thick fiber glass sheet roof (3 layers) fixed /riveted on molded curved frame of M.S box pipe1-1/2"x1-1/2"16-SWG supported on trusses of MS angle iron 1-1/2"x1 1/2"x3/16" all around duly supported on M.S sheet 6"x6"x1/4" welded on GI pipe post(Medium Quality) of specified diameter embedded in P:C: C(1:2:4) i/c the cost of excavation, cutting straightening assembling, bending as per design, welding/ grinding of joints and painting three coats complete in all respect as approved and directed by the Engineer Incharge. |           |               |               |               |
|                  |          | (i) 4" Dia GI Pipe Supports  | P.Sft     | 944.7         | 8,070.00      | 7,623,729.00  |

|                     |                     |    |                     |            |            |
|---------------------|---------------------|----|---------------------|------------|------------|
|                     | Separate entry exit | Ls | 1                   | 100,000.00 | 100,000.00 |
| <b>Total Amount</b> |                     |    | <b>9,685,435.04</b> |            |            |

#### Rough Cost Estimates of Bicycle Track:

| Track Length: Assume 2 km |  |              |          |            |                     |
|---------------------------|--|--------------|----------|------------|---------------------|
| Item No.                  | Description                              | Unit         | Quantity | Rate (PKR) | Total (PKR)         |
| 1                         | Excavation for Track Bed                 | Cubic Meter  | 500      | 700        | 350,000.00          |
| 2                         | Sub-base Material (Granular)             | Cubic Meter  | 300      | 1200       | 360,000.00          |
| 3                         | Asphalt Surface                          | Ton          | 200      | 8000       | 1,600,000.00        |
| 4                         | Concrete Surface (Alternative)           | Cubic Meter  | 100      | 6500       | 650,000.00          |
| 5                         | Edging/Retaining Walls                   | Linear Meter | 500      | 150        | 75,000.00           |
| 6                         | Landscaping (Planting Trees/Shrubs)      | Square Meter | 500      | 50         | 25,000.00           |
| 7                         | Benches (Wooden or Metal)                | Each         | 10       | 15000      | 150,000.00          |
| 8                         | Pathway Signage                          | Each         | 20       | 5000       | 100,000.00          |
| 9                         | Lighting Fixtures                        | Each         | 15       | 10000      | 150,000.00          |
| 10                        | Miscellaneous (Contingency, Tools, etc.) | Lump Sum     | 1        | 100000     | 100,000.00          |
| <b>Total Amount R.s</b>   |  |              |          |            | <b>3,560,000.00</b> |

#### Rough Cost Estimates of Heritage Walks:

| Item No.                | Description                                       | Unit   | Quantity | Rate (PKR) | Total (PKR)         |
|-------------------------|---|--------|----------|------------|---------------------|
| 1                       | Site Preparation (clearing, earthworks, etc.)     | sq. m. | 3000     | 50         | 150,000.00          |
| 2                       | Pathway Construction (Cobblestone/Brick)          | sq. m. | 1500     | 1200       | 1,800,000.00        |
| 3                       | Base Layer Preparation (Crushed Stone/Gravel)     | cu. m. | 150      | 2000       | 300,000.00          |
| 4                       | Footpath Edging                                   | m      | 1000     | 200        | 200,000.00          |
| 5                       | Landscape Planting (Trees, shrubs, grass)         | sq. m. | 1000     | 100        | 100,000.00          |
| 6                       | Benches Installation                              | each   | 10       | 23700      | 237,000.00          |
| 7                       | Signage Installation                              | each   | 15       | 30000      | 450,000.00          |
| 8                       | Solar-powered Lighting Installation               | each   | 20       | 22000      | 440,000.00          |
| 9                       | Historical Displays (Interpretive signs/displays) | each   | 5        | 18000      | 90,000.00           |
| <b>Total Amount R.s</b> |   |        |          |            | <b>3,767,000.00</b> |

### Rough Cost Estimates of Virtual Gallery:

| Item No.                | Description                                     | Unit | Quantity | Rate (PKR) | Total (PKR)         |
|-------------------------|---|------|----------|------------|---------------------|
| 1                       | Platform Development (Website/App)              | each | 1        | 700,000.00 | 700,000.00          |
| 2                       | Content Creation                                | each | 1        | 300,000.00 | 300,000.00          |
| 3                       | Interactive Features (3D Models, Virtual Tours) | each | 1        | 400,000.00 | 400,000.00          |
| 4                       | User Interface Design (UI/UX)                   | each | 1        | 100,000.00 | 100,000.00          |
| 5                       | Audio Guides and Narration                      | each | 1        | 50,000.00  | 50,000.00           |
| 6                       | Hosting and Domain Registration (Annual)        | year | 1        | 30,000.00  | 30,000.00           |
| 7                       | Marketing and Promotion                         | each | 1        | 150,000.00 | 150,000.00          |
| <b>Total Amount R.s</b> |   |      |          |            | <b>1,730,000.00</b> |

### Rough Cost Estimates of Camping Facility:

| <b>Rough Cost Estimate of Heritage Camping, Hiran Minar</b> |  |       |          |            |                     |
|---|--|-------|----------|------------|---------------------|
| Sr No   | Item   | Unit  | Quantity | Rate (PKR) | Total (PKR)         |
| <b>1</b>  | <b>Local Hiring for Site Operations</b>  |       |          |            |                     |
| a   | Tour guides  | Each  | 1        | 10,000,000 | 10,000,000          |
| b   | Maintenance and sanitation staff   |       |          |            |                     |
| c   | Dispensary assistants and first aid providers  |       |          |            |                     |
| <b>2</b>  | <b>Small Business Opportunities on Site</b>  | Each  |          |            |                     |
| a   | Souvenirs (handicrafts, postcards, books)  | Each  | 10       | 50,000     | 500,000             |
| b   | Traditional food and beverages   | Each  | 5        | 30,000     | 150,000             |
| c   | Eco-friendly products and bottled water  | Each  | 5        | 20,000     | 100,000             |
| <b>3</b>  | <b>Women-led Enterprise Initiatives</b>  |       |          |            |                     |
| a   | Encourage local women to participate through crafts, textile products, or food items | Each  | 5        | 15,000     | 75,000              |
| <b>4</b>  | <b>Informal Surveillance and Anti-Vandalism</b>                                      | Job   | 1        | 200,000    | 200,000             |
|   | <b>Dispensary</b>  | LS    | 1        | 825,000    | 825,000             |
|   | <b>Lost and Found</b>  | Sq. m | 60       | 1,000.00   | 60,000.00           |
| <b>Total Amount R.s</b>                                     |  |       |          |            | <b>1,910,000.00</b> |

### Rough Cost Estimates of Children Soft Playground:

| Ref No                  | Item No | Description of Items   | Unit         | Rate (PKR)* | As Per Qty |                     |
|-------------------------|---------|--|--------------|-------------|------------|---------------------|
|                         |         |  |              |             | Qty        | Amount (PKR)*       |
| N.s                     | 1       | Soft play surface materials (foam, rubber)   | Sq.M         | 1,500       | 1858.608   | 2,787,912.00        |
| N.s                     | 2       | Playground equipment (Toddlers Play area, Kids play Area, Flying fox, slides, swings, Scooty and Bicycle track, Skate Park and Pergola, and benches, etc.) | Set          | 1           | 1550000    | 1,550,000.00        |
| N.s                     | 3       | Safety mats for impact absorption  | Sq.M         | 800         | 1050       | 840,000.00          |
| N.s                     | 4       | Fencing around the playground  | Linear Meter | 1,250       | 550        | 687,500.00          |
| N.s                     | 5       | Landscaping and turf for the playground area   | Sq.M         | 300         | 500        | 150,000.00          |
| N.s                     | 6       | Skating ramp materials wood  | Sq.M         | 2,500       | 150        | 375,000.00          |
| N.s                     | 7       | Skating Park equipment (rails, barriers, etc.)   | Set          | 500,000.00  | 1          | 500,000.00          |
| N.s                     | 8       | Lighting for the park  | Unit         | 22,500      | 20         | 450,000.00          |
| N.s                     | 9       | Benches and seating areas  | Each         | 23,500      | 10         | 235,000.00          |
| N.s                     | 10      | Labor (installation and construction)  | LS           | 100,000     | 1          | 100,000.00          |
| N.s                     | 11      | Miscellaneous (transportation, tools, etc.)  | LS           | 50,000      | 1          | 50,000.00           |
| <b>Total Amount R.s</b> |         |  |              |             |            | <b>7,725,412.00</b> |

#### Rough Cost Estimates of Food Stalls Standardization:

| Item  | Unit  | Quantity | Rate (PKR) | Total (PKR) |
|---|-------|----------|------------|-------------|
| Site clearing and leveling                  | Sq. m | 300      | 50.00      | 15,000.00   |
| Grading for drainage                        | Sq. m | 200      | 30.00      | 6,000.00    |
| Fencing (temporary)                         | Meter | 100      | 200.00     | 20,000.00   |
| Wooden structure for each stall             | Each  | 5        | 15,000.00  | 75,000.00   |
| Stainless steel countertop (for each stall) | Each  | 5        | 20,000.00  | 100,000.00  |
| Shelving units (for storage)                | Each  | 5        | 5,000.00   | 25,000.00   |
| Canvas or tarpaulin (for cover)             | Sq. m | 100      | 300.00     | 30,000.00   |
| Electrical wiring and fixtures              | Lot   | 1        | 20,000.00  | 20,000.00   |
| Water supply connection                     | Lot   | 1        | 15,000.00  | 15,000.00   |

|  |       |    |           |                   |
|--|-------|----|-----------|-------------------|
| Drainage system                          | Lot   | 1  | 10,000.00 | 10,000.00         |
| Cooking equipment (grills, fryers, etc.) | Lot   | 5  | 40,000.00 | 200,000.00        |
| Refrigeration units (for food storage)   | Each  | 2  | 30,000.00 | 60,000.00         |
| Painting and signage for stalls          | Lot   | 1  | 15,000.00 | 15,000.00         |
| Flooring (tiles or other materials)      | Sq. m | 80 | 1,000.00  | 80,000.00         |
| Lighting fixtures                        | Lot   | 1  | 10,000.00 | 10,000.00         |
| <b>Total Amount R.s</b>                  |       |    |           | <b>681,000.00</b> |

#### Rough Cost Estimates of Wooden Gazebos:

| Ref No                  | Item No | Description of Items                     | Unit        | Rate (PKR)* | As Per Qty |                   |
|-------------------------|---------|--|-------------|-------------|------------|-------------------|
|                         |         |  |             |             | Qty        | Amount (PKR)*     |
| N.s                     | 1       | Wooden posts                             | Each        | 3,000       | 6          | 18,000.00         |
| N.s                     | 2       | Wooden beams (for roofing and support)   | Cft         | 1,150       | 15         | 17,250.00         |
| N.s                     | 3       | Wooden planks (for flooring)             | Sft         | 600         | 144        | 86,400.00         |
| N.s                     | 4       | Wooden railing (for security and design) | Linear Feet | 400         | 200        | 80,000.00         |
| N.s                     | 5       | Roof covering                            | Sft         | 750         | 200        | 150,000.00        |
| N.s                     | 6       | Coating (Varnish/Paint)                  | Litre       | 2,500       | 3          | 7,500.00          |
| N.s                     | 7       | Screws and fasteners                     | Kg          | 550         | 1          | 550.00            |
| N.s                     | 8       | Sandpaper (various grits)                | Pack        | 400         | 1          | 400.00            |
| N.s                     | 10      | Labor (Carpentry and Installation)       | Per Gazebo  | 20,000      | 1          | 20,000.00         |
| N.s                     | 11      | Miscellaneous (Transportation, etc.)     | L.s         | 3000        | 1          | 3000              |
| <b>Total Amount R.s</b> |         |  |             |             |            | <b>383,100.00</b> |

#### Rough Cost Estimates for Wooden Sitting Bench:

| Ref No | Item No | Description of Items         | Unit  | Rate (PKR)* | As Per Qty |               |
|--------|---------|------------------------------|-------|-------------|------------|---------------|
|        |         |                              |       |             | Qty        | Amount (PKR)* |
| N.s    | 1       | Wooden planks (Teak or Pine) | Cft   | 450         | 21.25      | 9,562.50      |
| N.s    | 2       | Wooden legs (solid wood)     | Each  | 300         | 4          | 1,200.00      |
| N.s    | 3       | Coating (Varnish/Paint)      | Litre | 2,000       | 2          | 4,000.00      |
| N.s    | 4       | Screws and fasteners         | Kg    | 500         | 1          | 500.00        |
| N.s    | 5       | Sandpaper (various grits)    | Pack  | 500         | 1          | 500.00        |

|                         |   |                                      |           |       |   |                  |
|-------------------------|---|--------------------------------------|-----------|-------|---|------------------|
| N.s                     | 6 | Labor (Carpentry and Installation)   | Per Bench | 5,000 | 1 | 5,000.00         |
| N.s                     | 7 | Miscellaneous (Transportation, etc.) | L.s       | 2000  | 1 | 2000             |
| <b>Total Amount R.s</b> |   |                                      |           |       |   | <b>22,762.50</b> |

#### Rough Cost Estimates for Board Walk and Shops Front:

| Ref No                  | Item No | Description of Items                                 | Unit         | Rate (PKR)* | As Per Qty |                     |
|-------------------------|---------|--|--------------|-------------|------------|---------------------|
|                         |         |  |              |             | Qty        | Amount (PKR)*       |
| 3/21-1-ii               | 1       | Excavation and site preparation                      | Cm           | 559         | 150        | 83,917.50           |
| 6/6                     | 2       | Foundation (Concrete footings)                       | Per Cum      | 22,040      | 15         | 330,595.50          |
| N.s                     | 3       | Wooden decking for boardwalk (e.g., treated timber)  | Sq.M         | 2,200       | 400        | 880,000.00          |
| N.s                     | 4       | Framing and support beams for the boardwalk          | Linear Meter | 2,000       | 300        | 600,000.00          |
| N.s                     | 5       | Railing for boardwalk (wood)                         | Linear Meter | 1,000       | 120        | 120,000.00          |
| N.s                     | 6       | Shop construction (walls and roof, including finish) | Sq.M         | 20,000      | 150        | 3,000,000.00        |
| N.s                     | 7       | Shop interiors (finishing, flooring, fixtures)       | Sq.M         | 15,000      | 150        | 2,250,000.00        |
| N.s                     | 8       | Electrical work (wiring, lighting for shops)         | LS           | 100,000     | 1          | 100,000.00          |
| N.s                     | 9       | Plumbing work (if applicable for shops)              | Each         | 50,000      | 1          | 50,000.00           |
| N.s                     | 10      | Landscaping and external works                       | Sq.M         | 2,000       | 100        | 200,000.00          |
| N.s                     | 11      | Miscellaneous (transportation, waste disposal etc.)  | LS           | 50,000      | 1          | 50,000.00           |
| <b>Total Amount R.s</b> |         |  |              |             |            | <b>7,664,513.00</b> |

#### Rough Cost Estimates of Heritage Illumination:

| Sr No                            | Description of Work            | Unit   | Quantity | Rate (PKR) | Total (PKR)  |
|----------------------------------|--------------------------------|--------|----------|------------|--------------|
| <b>Illumination System</b>       |                                |        |          |            |              |
| 1                                | LED Flood Lights (100W)        | Each   | 50       | 20,800.00  | 1,040,000.00 |
| 2                                | Decorative Wall Washers        | Each   | 30       | 15,700.00  | 471,000.00   |
| 3                                | Smart Control System (Dimmers) | Each   | 10       | 13,000.00  | 130,000.00   |
| 4                                | Mounting Hardware              | Set    | 50       | 2,000.00   | 100,000.00   |
| <b>Electrical Infrastructure</b> |                                |        |          |            |              |
| 1                                | Power Supply Installation      | LS     | 1        | 170,000.00 | 170,000.00   |
| 2                                | Wiring and Cabling             | Meters | 1000     | 400.00     | 400,000.00   |

|   |                                    |       |     |                     |                     |
|---|------------------------------------|-------|-----|---------------------|---------------------|
| 3 | Circuit Breakers/Distribution Box  | Each  | 6   | 7,500.00            | 45,000.00           |
|   | <b>Installation and Labor</b>      |       |     |                     | -                   |
| 1 | Labor for Installation             | Hours | 100 | 2,000.00            | 200,000.00          |
| 2 | Skilled Labor for Electrical Works | Hours | 50  | 3,000.00            | 150,000.00          |
| 3 | Site Cleanup and Restoration       | LS    | 1   | 50,000.00           | 50,000.00           |
|   | <b>Testing and Commissioning</b>   |       |     |                     | -                   |
|   | Testing of Electrical Systems      | LS    | 1   | 100,000.00          | 100,000.00          |
|   |                                    |       |     | <b>Total Amount</b> | <b>2,856,000.00</b> |

**Rough Cost Estimates of Conservation efforts of architectural details and Mughal structures like Minaret, gate, grave:**

| Item   | Unit  | Quantity | Rate (PKR)          | Total (PKR)           |
|--|-------|----------|---------------------|-----------------------|
| Preliminary cleaning (sandblasting, etc.)                      | Sq. m | 5,000.00 | 350.00              | 1,750,000.00          |
| Safety measures and scaffolding setup                          | Lot   | 1.00     | 300,000.00          | 300,000.00            |
| Masonry repairs (bricks/stone, re-pointing)                    | Sq. m | 3,000.00 | 7,000.00            | 21,000,000.00         |
| Structural reinforcement                                       | Lot   | 1.00     | 750,000.00          | 750,000.00            |
| Replacement of damaged architectural elements                  | Each  | 1,000.00 | 25,000.00           | 25,000,000.00         |
| Restoration of frescoes and wall paintings                     | Sq. m | 5,000.00 | 5,000.00            | 25,000,000.00         |
| Replacement of inlaid work (marble, tiles)                     | Sq. m | 3,000.00 | 7,000.00            | 21,000,000.00         |
| Cleaning and preserving calligraphy                            | Sq. m | 2,000.00 | 8,000.00            | 16,000,000.00         |
| Structural reinforcement of gates                              | Each  | 50.00    | 40,000.00           | 2,000,000.00          |
| Conservation techniques for minarets (stone repairs, cleaning) | Each  | 30.00    | 70,000.00           | 2,100,000.00          |
| Landscaping around gates and minarets                          | Sq. m | 2,000.00 | 1,000.00            | 2,000,000.00          |
| Detailed documentation of the conservation process             | Lot   | 1.00     | 330,000.00          | 330,000.00            |
| Reporting on structural integrity and material conditions      | Lot   | 1.00     | 200,000.00          | 200,000.00            |
|  |       |          | <b>Total Amount</b> | <b>117,430,000.00</b> |

**Rough Cost Estimates of of Installation of Solar panel array and focusing on Hiran Minar site to go net zero carbon heritage site as a global example:**

| Item No | Description of Work      | Unit | Quantity | Rate (PKR) | Total (PKR)  |
|---------|--------------------------|------|----------|------------|--------------|
|         | <b>Solar Panels</b>      |      |          |            |              |
| 1.1     | 550 W Solar Panels       | Each | 92       | 20,000.00  | 1,840,000.00 |
|         | <b>Inverters</b>         |      |          |            | -            |
| 2.1     | 50 kW Grid-Tied Inverter | Each | 1        | 750,000.00 | 750,000.00   |

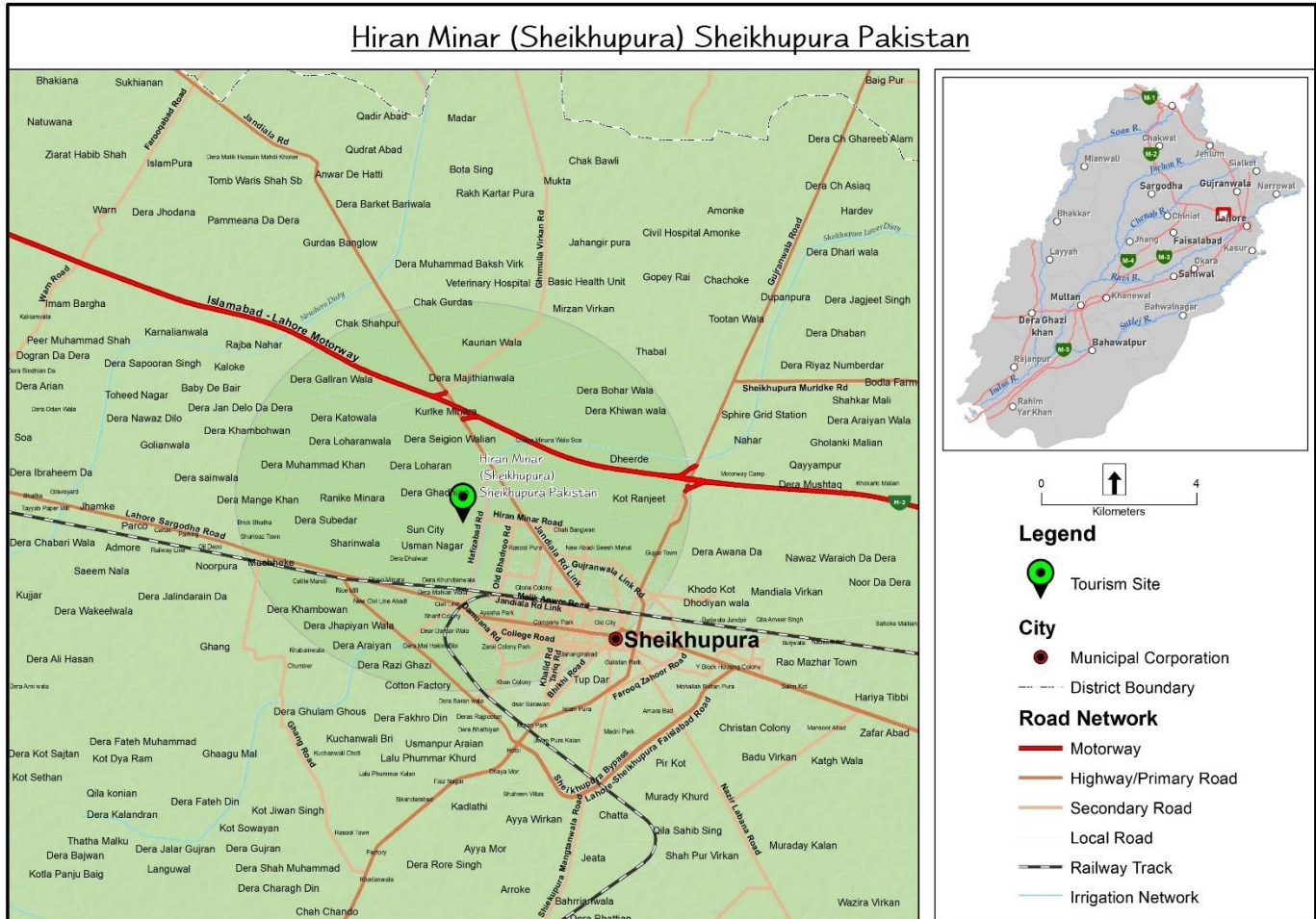
|     |   |        |      |                     |                     |
|-----|---|--------|------|---------------------|---------------------|
|     | <b>Mounting Structure</b>                               |        |      |                     | -                   |
| 3.1 | Solar Panel Mounting Structure (including installation) | LS     | 1    | 450,000.00          | 450,000.00          |
|     | <b>Electrical Components</b>                            |        |      |                     | -                   |
| 4.1 | AC & DC Cable (including connectors)                    | Meters | 1000 | 450.00              | 450,000.00          |
| 4.2 | Circuit Breakers and Safety Switches                    | Each   | 10   | 30,000.00           | 300,000.00          |
| 4.3 | Junction Boxes  | Each   | 10   | 15,000.00           | 150,000.00          |
|     | <b>Installation and Labor</b>                           |        |      |                     | -                   |
| 5.1 | Labor for Installation                                  | Hours  | 100  | 1,500.00            | 150,000.00          |
| 5.2 | Transportation of Equipment                             | LS     | 1    | 25,000.00           | 25,000.00           |
|     | <b>Testing and Commissioning</b>                        |        |      |                     | -                   |
| 6.1 | Testing and Commissioning                               | LS     | 1    | 120,000.00          | 120,000.00          |
|     |   |        |      | <b>Total Amount</b> | <b>4,235,000.00</b> |

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# Annexures

## Annex – A: Hiran Minar, Sheikhupura Map



## Annex – B: Hiran Minar Inventory

### Flora/Fauna & Habitat Suitability

Hiran Minar is a Mughal-period complex and is built in the game reserve in Sheikhpura in Punjab. Hiran Minar was built in memory of the beloved antelope “Mansraj” of Mughal Emperor Jahangir. Hiran Minar consists of many historical infrastructures that were constructed in different eras. It has a vast garden, water resources, pavilions, walkways, and a green area on one side. The green area is suitable for biodiversity and wildlife. Different types of biodiversity can be observed in the Hiran Minar area due to ecosystem diversity. The presence of water resources and green vegetation cover makes the ecosystem suitable for biodiversity. The site area provides a rich diversity of birds. All other diversity of reptiles, amphibians, and mammals can be observed.

### Habitat Suitability:

Ecosystem diversity makes the area of Hiran Minar site suitable for wildlife and biodiversity. Historic records show that the Minar was built in the Game Reserve Area and is also famous for beloved deer of Emperor Jahangir. Historic records provide the rich diversity of mammals, birds, amphibians, and reptiles. The presence of vegetation cover, forest, hills, water resources, and a proper approach in the area provides a thriving suitability for biodiversity. Some years ago, the wildlife department also paid attention to establishing a mini zoo to provide tourism facilities to the public. Ecosystem diversity and historic records make ecosystem suitable for wildlife and biodiversity. Many antelope and ungulate species can be introduced in the area of Hiran Minar to promote tourism and conservation.



Some observed flora and fauna species are shown in the table below:

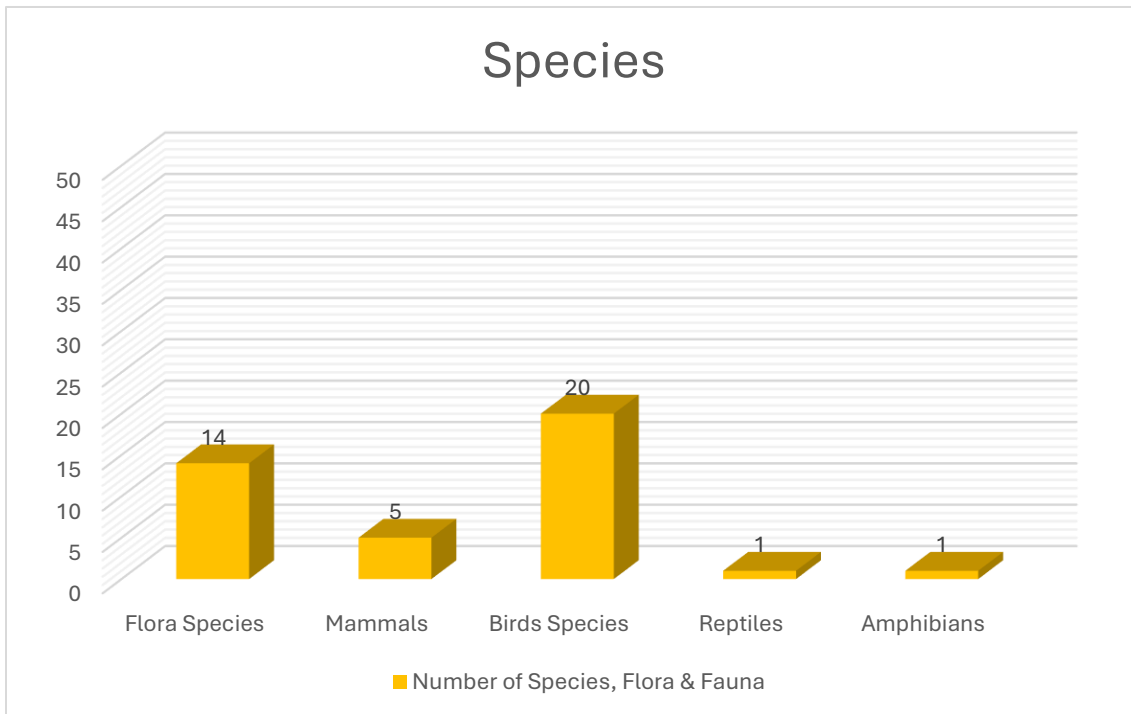
#### FLORA SPECIES:

| Sr. # | Name     | Scientific Name            | Local Status |
|-------|----------|----------------------------|--------------|
| 1.    | Safaída  | <i>Eucalyptus</i>          | Abundant     |
| 2.    | Shehtoot | <i>Morus Alba</i>          | Abundant     |
| 3.    | Popular  | <i>Populus</i>             | Abundant     |
| 4.    | Sheesham | <i>Dalbergia sissoo</i>    | Abundant     |
| 5.    | Keekar   | <i>Accacia nilotica</i>    | Common       |
| 6.    | Simal    | <i>Bombax ceiba</i>        | Common       |
| 7.    | Bairry   | <i>Ziziphus mauritiana</i> | Common       |
| 8.    | Bakain   | <i>Melia azedarach</i>     | Common       |
| 9.    | Jammun   | <i>Syzygium cumini</i>     | Common       |
| 10.   | Amaltas  | <i>Cassia fistula</i>      | Common       |
| 11.   | Deodar   | <i>Cedrus deodara</i>      | Common       |
| 12.   | Kachnar  | <i>Bauhinia variegata</i>  | Common       |
| 13.   | Peepal   | <i>Ficus religiosa</i>     | Common       |
| 14.   | Siris    | <i>Albizia lebbbeck</i>    | Common       |

#### FAUNA SPECIES:

| Sr. #           | Name                 | Scientific Name                  | Local Status |
|-----------------|----------------------|----------------------------------|--------------|
| <b>MAMMALS:</b> |                      |                                  |              |
| 1.              | Mongoos              | <i>Herpestes javanicus</i>       | Common       |
| 2.              | Porcupine            | <i>Erethizon dorsatum</i>        | Common       |
| 3.              | Wildboar             | <i>Sus scrofa</i>                | Common       |
| 4.              | Jackal               | <i>Canis aureus</i>              | Common       |
| 5.              | Jungle Cat           | <i>Felis chaus</i>               | Common       |
| <b>BIRDS:</b>   |                      |                                  |              |
| 1.              | House Sparrow        | <i>Passer domesticus</i>         | Common       |
| 2.              | Rose Ringed Parakeet | <i>Psittacula krameri</i>        | Common       |
| 3.              | Little Brown Dove    | <i>Phapitreron brevirostris</i>  | Common       |
| 4.              | Black Francolin      | <i>Francolinus francolinus</i>   | Common       |
| 5.              | Grey Francolin       | <i>Francolinus pondicerianus</i> | Common       |
| 6.              | Rock Pigeon          | <i>Columba livia</i>             | Common       |
| 7.              | Greater Coucal       | <i>Centropus sinensis</i>        | Common       |
| 8.              | Red Wattled Lapwing  | <i>Vanellus indicus</i>          | Common       |
| 9.              | Cattle Egret         | <i>Ardea coromanda</i>           | Common       |
| 10.             | Great Egret          | <i>Ardea alba</i>                | Common       |
| 11.             | Black kite           | <i>Milvus migrans</i>            | Common       |
| 12.             | Spotted owlet        | <i>Athene brama</i>              | Common       |
| 13.             | Common Kingfisher    | <i>Alcedo atthis</i>             | Common       |
| 14.             | House Crow           | <i>Corvus spendens</i>           | Common       |

|                    |                    |                                  |        |
|--------------------|--------------------|----------------------------------|--------|
| 15.                | Red Wattled Bulbul | <i>Pycnonotus cafer</i>          | Common |
| 16.                | Common Babbler     | <i>Argy caudate</i>              | Common |
| 17.                | Black Drongo       | <i>Dicrurus macrocercus</i>      | Common |
| 18.                | Wagtail            | <i>Motacilla maderaspatensis</i> | Common |
| 19.                | Hoopoe             | <i>Upupa epops</i>               | Common |
| 20.                | Common Myna        | <i>Acredotheres tristis</i>      | Common |
| <b>REPTILES:</b>   |                    |                                  | Common |
| 1.                 | Monitor lizard     | <i>Varanus</i>                   | Common |
| <b>AMPHIBIANS:</b> |                    |                                  |        |
|                    | Toad               | <i>Bufo stomaticus</i>           | Common |





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Neha specializes in restoration and design of projects with historical significance, and her consulting services offer clients a unique blend of creativity, technical proficiency, and a deep understanding of architectural heritage. Throughout her career, she has demonstrated success in managing complex projects, including her current role in the Kew Gardens project with PRL. Other eminent projects in her career include Garrison Officers Mess masterplan and old building, Napier Lodges, and restoration of Aitchison College.

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