

CONSTRUCTED WETLAND

SUSTAINABLE INTEGRATED DEVELOPMENT
STP, SECTOR 54, NOIDA

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Aim & Objective

Aim

- **Pollution in various forms is there and staying with no sight of its going away**
- **Grey and Black water is pollutant but a resource**
- **We need to create a sustainable development utilizing public participation**
- **Sustainable developments is key for any development model and our present Government is taking all possible steps towards that direction. This was discussed and shared by CM Yogi ji in assemble session**

The advantages of grey water

- **Its always in constant supply as long as people are there. We should take it as an opportunity to create a landscape which does not replicate England or Japan but has its own unique flavor.**
- **Plants and vegetation stated in our sculptures are local to the region**

We can create

Ecologies with birds/ plants and mini eco system which will look beautiful

Utilizing grey water then once the nutrients are extracted some water can be utilized as a reserve

Public Participation

- **Noida has a very vibrant citizenry and if appropriate sculptures and design are chosen, a lot of construction and other forms of waste can be utilized to beautify the park and designs of lesser known places and structures created by association from those regions can be used**
- **Social impact and creation of social capital reduces crime and make open spaces more sustainable. So if citizens have made contribution planting trees or groups making design of structure from their home town or dedicating podiums, platforms, flower bed in memory of their near and dear ones is found to reduce delinquent behaviour**
- **Citizen across the world are moving away from federal funding and our design reflects this**

Constituents

1. **Park Constituents bring down the cost**
2. **Maintenance is not effected**
3. **Fencing need not to be decorative, it can be part wire and part vegetation**
4. **Pathways through pitching**
5. **Embankment of water bodies through pitching of racks and segregation of construction waste**
6. **Water bodies shall not have a concrete base**
7. **No formal landscape areas, stone, sculptures or granite monument until paid through public subscription**
8. **Entrance gate, entry fountains, and entry haat structure shall be beautiful and attractive**
9. **The purple colour symbolizes colours of Paramvir Chkara, Mahavir Chakra. Hycen flowers beds at entries**
10. **We shall make structures such as Banaras Ghat, Ayodhya Ghat, Brij Bhoomi, Vrindavan. It can potential to become part of Brij circuit.**
11. **Lesser known structures such as Sun temple Mahoba, Chunar Fort, Kashi Vishwanath temple etc to create interest and awareness**
12. **Cow , Gobar, alternative energy methods, traditional mythological elements will create knowledge and awareness among children**
13. **At every bifurcation of pathways, we shall create feature of interest and information**

Creation of Ecologies and understanding of Ecologies

Creating awareness

Makes people understand impending threats

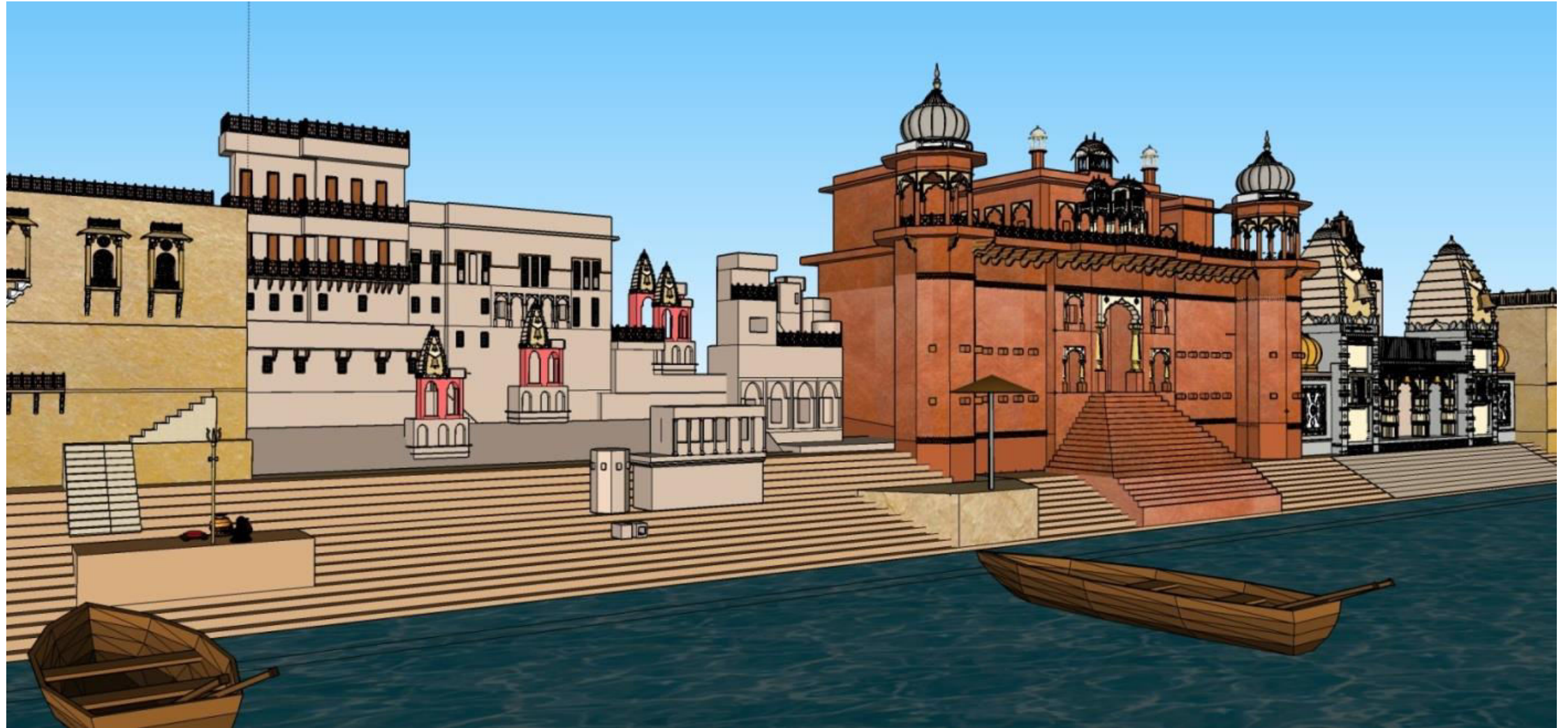
- **Grey Wetland- different trees and birds, abundance of these is threat for health**
- **Fresh water ecologies**
- **Green spaces, green house**
- **Stylised Ecology- Plantation, Nursery**

**PROPOSED STRUCTURE MADE OUT OF
CONSTRUCTION WASTE**

PRAYAGRAJ CHURCH



Kashi Ghats as live illustration with Boating facilities



Kashi Vishwanath Temple



Kashi Vishwanath Temple



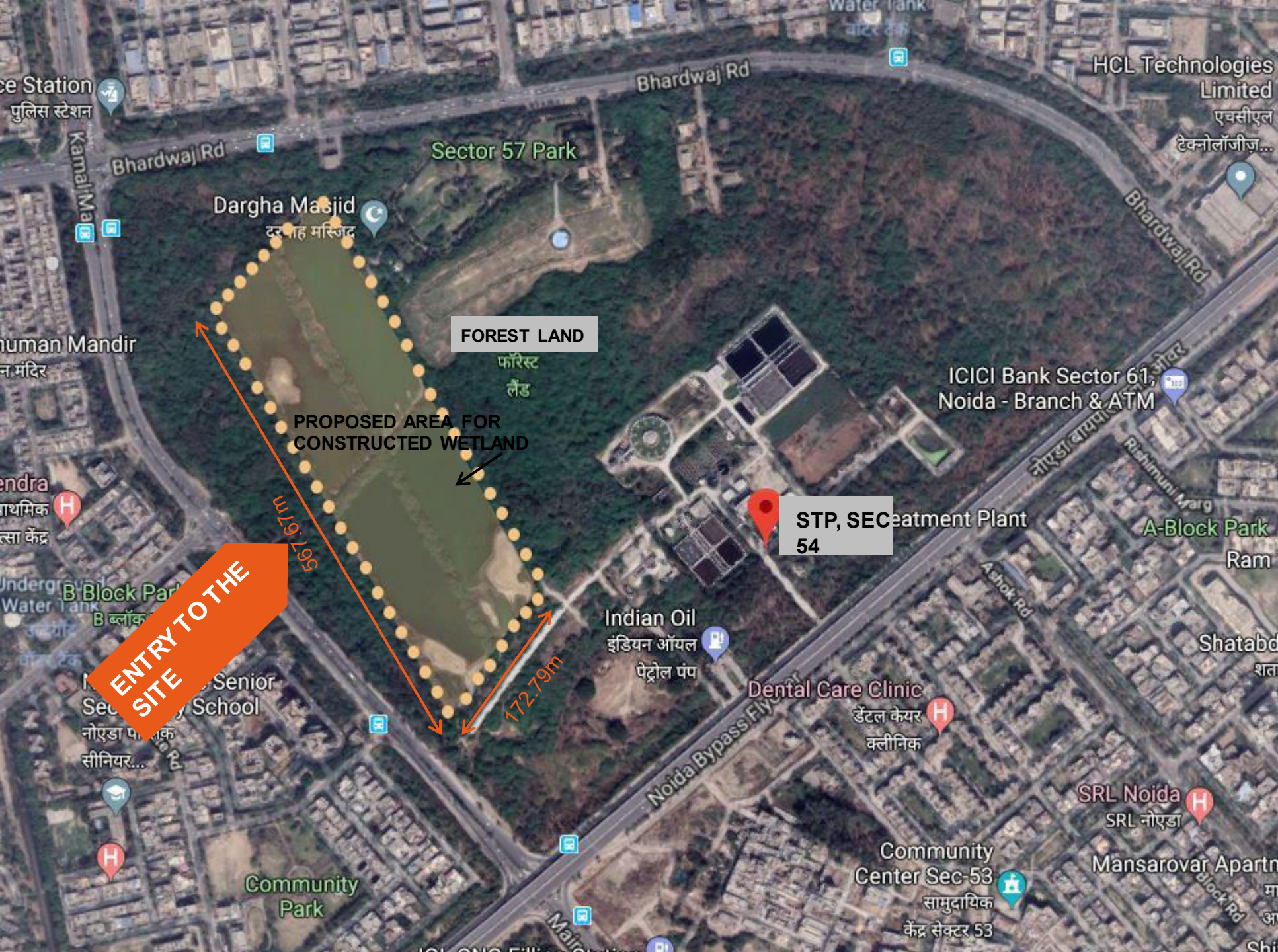
Sirhi Darwaja (Taj Mahal Southern Gateway)



Ecology
Energy Systems
Climate change
Public Facilities

Tree Shape Solar Canopy





LOCATION

Google Image of site location and surroundings

Site

Existing residential sectors



Existing forests\green belt



Receives sludge from other places



The Theme

Nature-

Being close to nature is the most ideal state in all culture.

This has been elaborated with all kinds of ecologies.

There are several issues with parks

- It is created out of public money
- Its space, resources and maintenance
- We don't have water quality
- Procedure need to change if water quality doesn't match
- Pollution more inside than outside
- Construction is minimum. Intrusion in nature such as creating pathways embankments, retaining walls ,shelters, boundary walls ,water bodies are all dismantlable in our design. Even park and play equipments can be made out of things like rubber tyre, waste pressed metal sheets, old auto parts etc.



Seating made of waste rubber tyre

Our approach



- Maximum vegetation and natural development and natural ecologies,
- Visitor should consider a sense of ownership to the park in some ways they should be made contribute to it.
- Land is expansive so people should receive education to come close to nature by finding space for activity which are not available anywhere else.
- People needs to be kept in mind that there should be a **wow!** Factor, we feed the perception of a public park with a grand entrance **A Braj Bhumi** .
- Play areas are that sensitive to the special needs and needs of the elderly .

-Our park offers four experiences

1. **Observing natural ecologies** – swampy water, wetland, ponds and lakes, forest, Flora and Fauna
2. **Cultural** - Pal Mein Pradesh darshan - a visit to the lesser known historically important monuments. Yoga center, open amphitheater
3. **Local activities** - Sustainable development goal points to the collaborative nature of the citizen in smart city. Ideas from school children, senior citizens plants and shrubs as memorials, chairs, benches, dustbins, play equipment can be created in situ. This not only brings a sense of ownership but also aids in the authority in concentrating on bigger problems.
4. **Learning environment is a global concern** - Nature friendly materials and Eco Friendly facilities.

-The park provides a blend of tradition and modern thoughts they shall be able to observe the difference lifestyle can make.

The people

From the statue of Ashoka, the utilization of construction waste, the Ghats to wetland, the power of collaboration between nature, people, public and the authority, all speak of the use of collaboration among each other. Lets see how it will work in context of the people .





Wetland Layout Plan



REMARKS:
 BUILDINGS SCALE IS INDICATIVE.
 THERE ARE MORE TREES AND FLORA BEDS IN THE SITE
 THAN SHOWN IN THIS LAYOUT.

Wetland Layout Plan

Main Entrance to the park inspired from Vrindavan



Vrindavan or Braj Bhumi as a living illustration



Use of nature friendly facilities



Solar Paneled Public Toilets

Its universally accessible for physically Challenged and disabled people . Electricity saver and exterior walls of terracotta in order of using only eco friendly materials



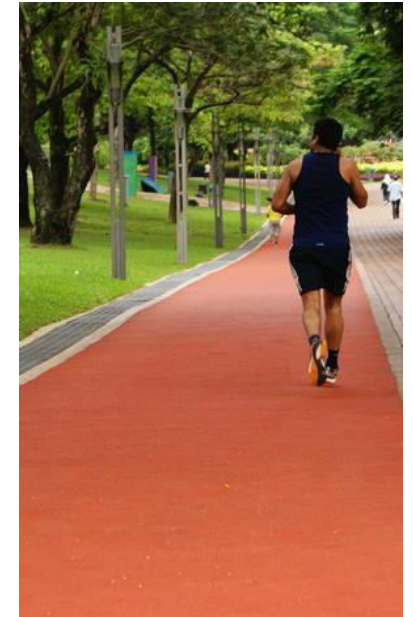
Dry-wet Waste Dustbin

Waste segregation to recycle dry **waste** easily and to use wet **waste** as compost



Solar Street Lamp Posts

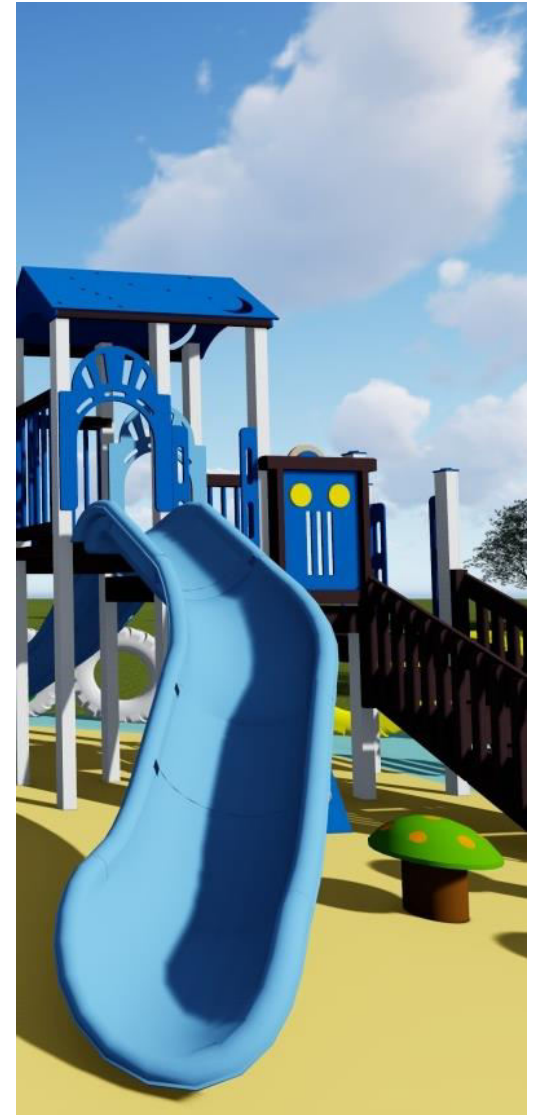
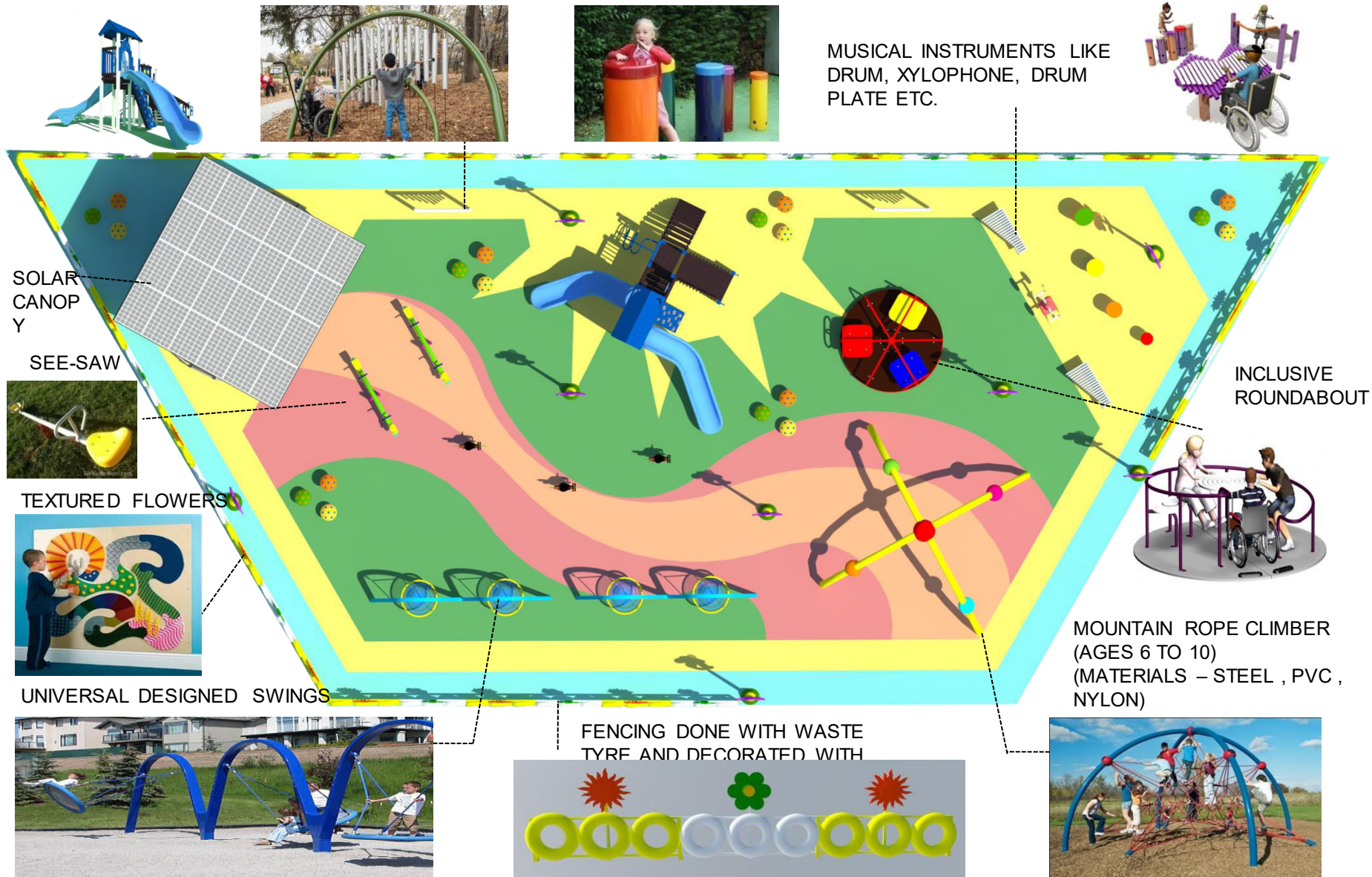
These self chargeable lamp are independent of the utility grid resulting to lessened operation costs.



Mud-Concrete Jogging Track

Fusion of mud and concrete For smooth and anti slippery path is also a concept from The Eco- friendly theme .

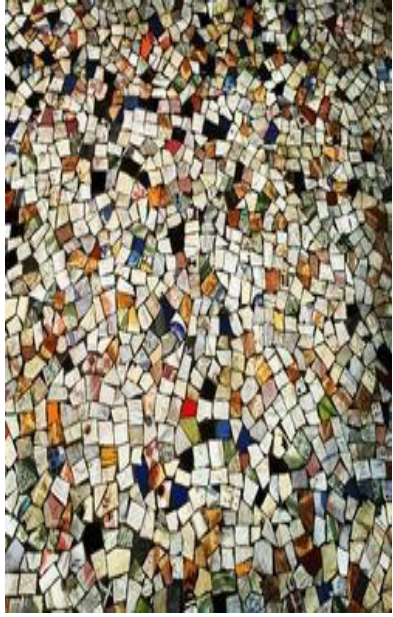
Modular Children Play Corner Inclusive to All



Outdoor gym



Use of nature friendly material



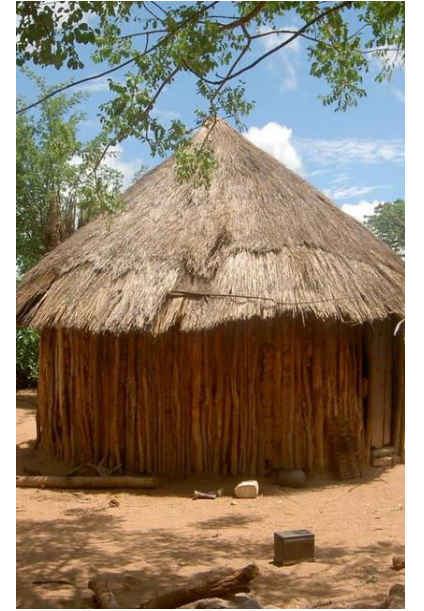
Broken China Tiles



Mud Plasters



**Waste Material
Sculptures**



Thatch Structures

Use of nature friendly material



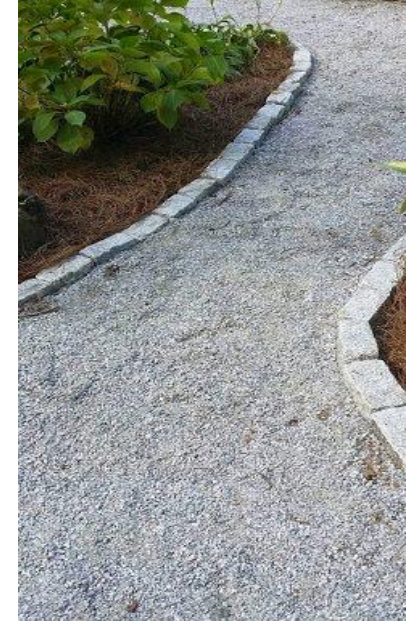
Mud Concrete Pathways



Grass Pavers Pathways



Slate Stone Pathways



Gravel Pathways

Cultural

PAL MEIN UP DARSHAN

WE CAN DEVELOP IT AS
**A GATEWAY TO UTTAR
PRADESH**

HAVING REPLICA OF
HERITAGE STRUCTURES

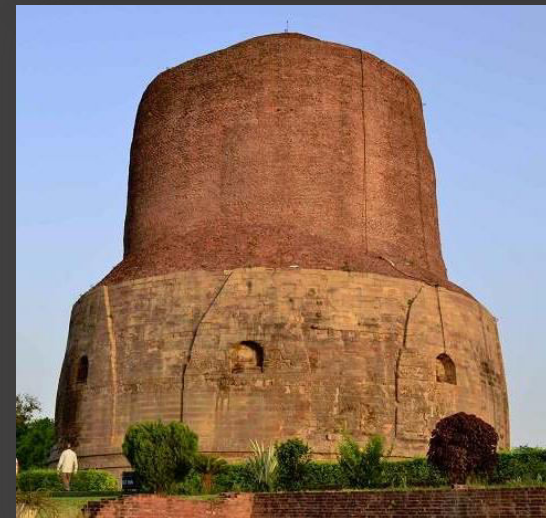
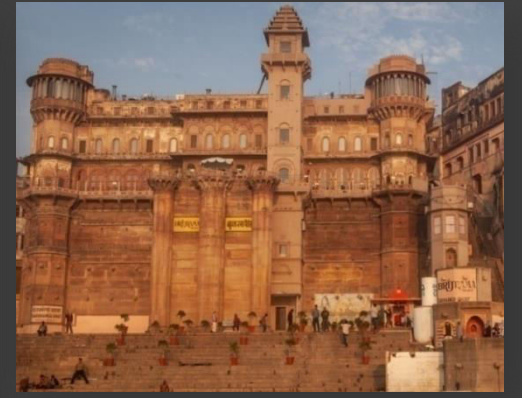
USING **CONSTRUCTION WASTE**



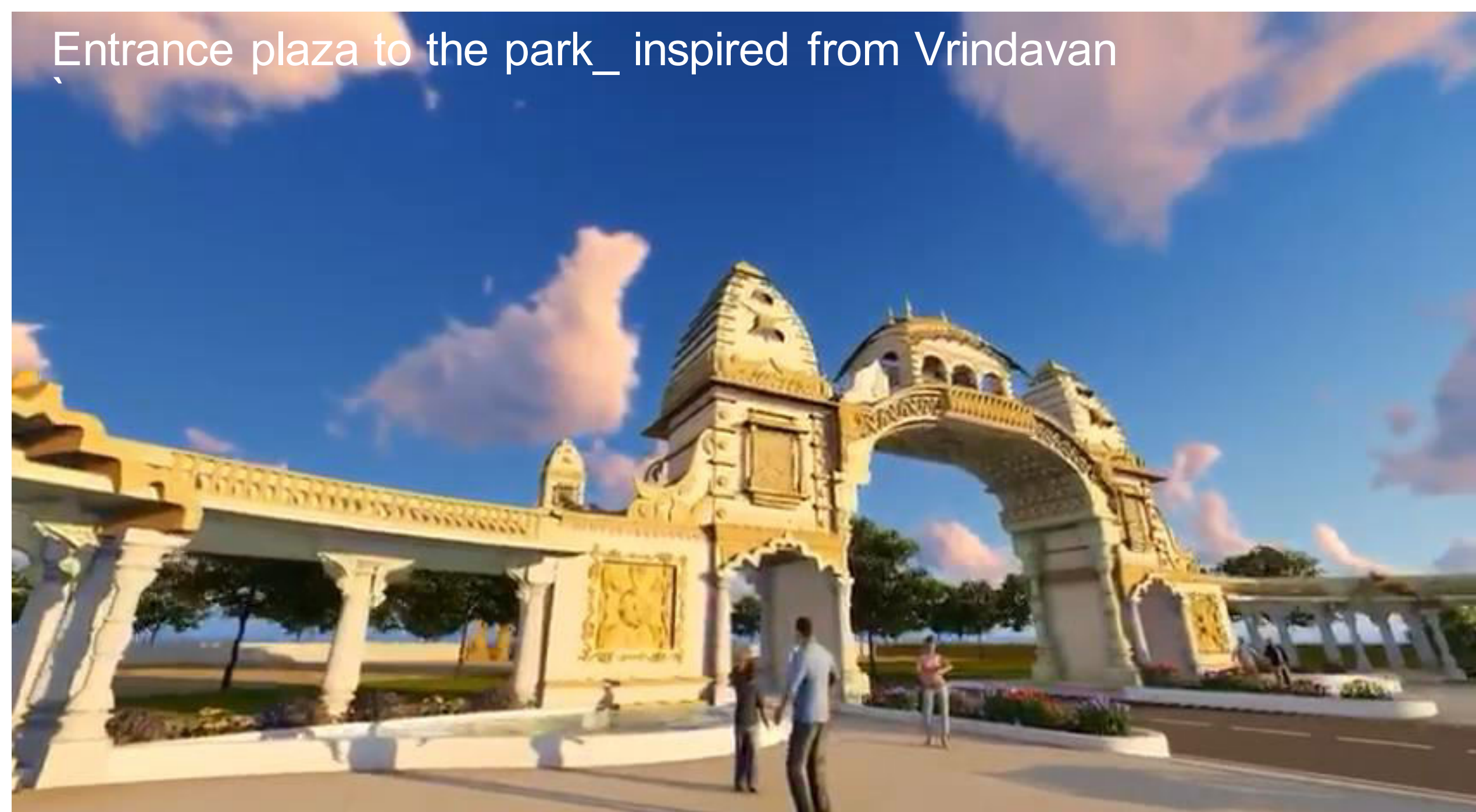
PAL MEIN UP DARSHAN

A VISIT TO ALL IMPORTANT SITES OF UP

- 1. BENARAS GHATS**
- 2. KABIR**
- 3. KASHI VISHWANATH**
- 4. RUMI DARWAZA**
- 5. VRINDAVAN**
- 6. CHURCH AT PRAYAGRAJ**
- 7. SURYA TEMPLE JHANSI**



Entrance plaza to the park_ inspired from Vrindavan



- Ruined Structures and submerged structures will attract a good variety of fauna.
- **Construction waste can be used to create follies, which is a traditional element in landscaping.**



RUINED STRUCTURE AND SUBMERGED STRUCTURES WORK AS POINT OF ATTRACTION

**CONSTRUCTION WASTE USED
TO CREATE FOLLIES
(REF. ROCK GARDEN, CHANDIGARH)**

AS IN EARLIER
CONSTRUCTED WETLANDS,
THE PROCESS OF
EXTRACTING WATER AND
NUTRIENTS WHICH CAN
TRANSFORM LAND INTO
LANDSCAPE,

BENEFITTING THE LAND,
ITS PEOPLE AND THE
ENVIRONMENT REMAINS AN
OBJECTIVE.



METHODOLOGY

NET OBJECTIVES

1. To create a theme based landscape park zone to benefit people and residents and enhance the brand value of NOIDA.
2. To create landscape using constructed wetland technology and using water available through existing 87 MLD STP.
3. Give an identity to the existing area through design and utilizing its existing resources to create features and elements.
4. Use locally available flora like elephant grass, cattalis, reeds, cannas pp. and yellow flag iris which are usual wetlands plants etc. and protect existing fauna like Brown Indian Hare, Mongoose of the region.



Local flora like cannas and yellow flower iris is proposed to be used

Wastewater constituent	Removal efficiency
Organic matter	80-90% (high)
Suspended solids	80-90% (high)
Phosphorus	Approx 20% (low)
Nitrogen	20-40% (low)
Coliforms	1-3 log units (medium)
Helminth eggs	Upto 3 log units (high)

Parameters to check the efficiency of Constructed Wetlands

5. Have vegetation that can handle toxicity against tannary, food factories, clothing manufactures and machinery industries that eliminate chemicals like formic acid, citric acid, monosodium glutamate, glycol, iron dust and cotton dust.
6. Open swamps should be able to support aquatic life like water snakes, frogs, fishes, dragon flies, crane and other wading birds.



Glimpse of employing construction waste
(ref. from Rock Garden Chandigarh.

6. Be absolute maintenance free as tanks for sedimentation, sand\ gravel, motor and plants need no technical or manual care on a daily basis.
7. Have own sources of power through solar systems using Jinko solar panels and its charge controller.
8. Appear natural; without construction as in our previous projects at Lucknow and Kanpur .
9. Employ construction waste.
10. Be educative; handling liquid kitchen and grey water is key. Most landscaping can be used for the purpose.

Canopies with solar panels, that will help have own sources of power



NRI CITY, KANPUR, (100 KLD



RUDRA HEIGHTS, VARANASI(100 KLD)

Some examples of our earlier works.

Flora and Fauna

- Purple water hyacinth flora bed(purple flower) are chosen as purple colour depicts symbol of **VALOUR AND SACRIFICE**
- Entry and exit of trucks carrying sludge from other places and their loading unloading in a corner area.
- Ingredients of sludge can be variable, area has access to anaerobic tanks for sedimentation, remediation areas for treatment of waste as well as percolation tanks.
- **Plants like vetiver, cattail, water canna, foliage water plants etc. are being used for Bio- Remediation.**
- Furnitures and canopies would be provided in regular intervals within the parks complex.



POOL WITH PURPLE FLOWER



Cattail

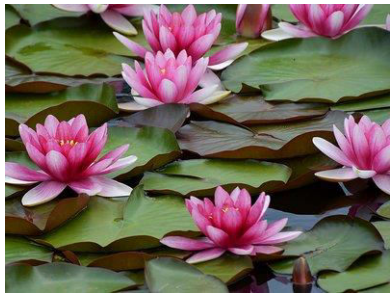
Plants, we shall be using for the constructed wetlands systems.



Reeds



Elephant Grass



Water lily



Yellow Flag Iris



Nerium



Cannas

- The system would be based on the specific plants, such as **Elephant grass** (*Pennisetumpurpurem*), **Cattails** (*Typha sp.*), **Reeds** (*Phragmitessp.*), **Cannas pp.** and **Yellow flag iris** (*Iris pseudocorus*), normally found in natural wetlands with filtration and treatment capability. Some ornamental as well as flowering plants species such as Golden Dhuranda, Bamboo, Nerium, Colosia, etc. could be used for treatment as well as landscaping purposes.

- The Constructed Wetland technology could be constructed **in series and parallel modules** .

- The Constructed Wetland technology treatment is a **subsurface flow type** in which wastewater is applied to cell / system filled with porous media such as crushed bricks, gravel and stones. The hydraulics will be maintained in such a manner that wastewater does not rise to the surface retaining a free board at the top of the filled media.

The system shall consists of the following three zones: **(i) inlet zone comprising of crushed bricks and different sizes of stones, (ii) treatment zone consisting of the same media as in inlet zone with plant species, and (iii) outlet zone.**

- ❖ Screening
pass through bar(cans, plastic packets).
- ❖ Pre treatment:
tank for sedimentation for about 24 hours,
for approaching grey water.
- ❖ Grit removal
settlement of sand, girt, stones.
- ❖ Primary treatment
to settle sludge and to remove oil and grease.
- ❖ Bio filtration
periphyton(group of micro organism that
break down organic material).

1



2



3

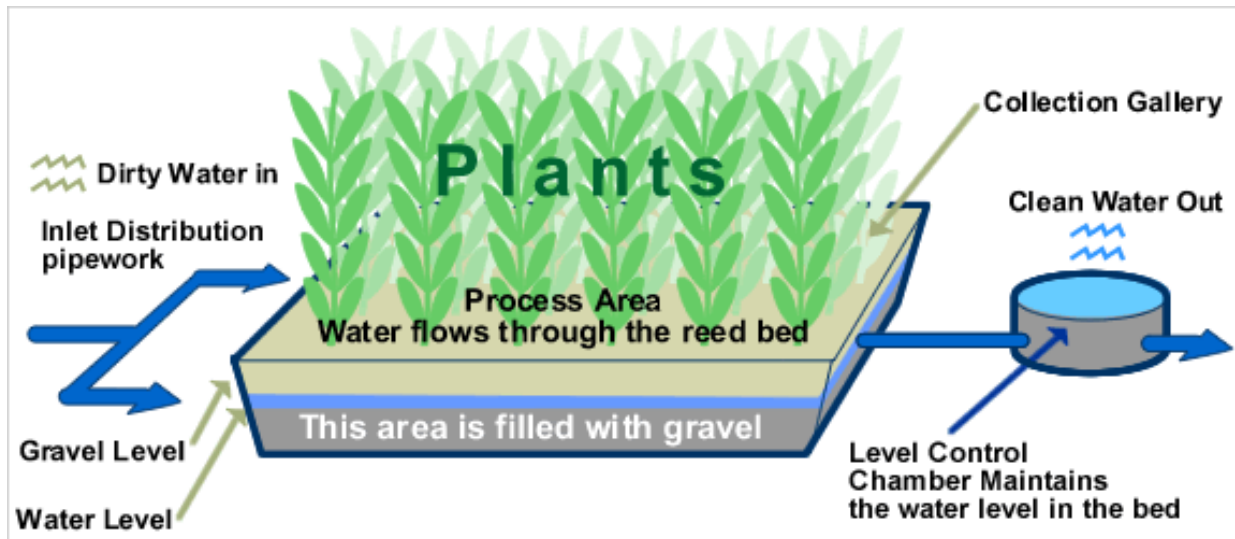


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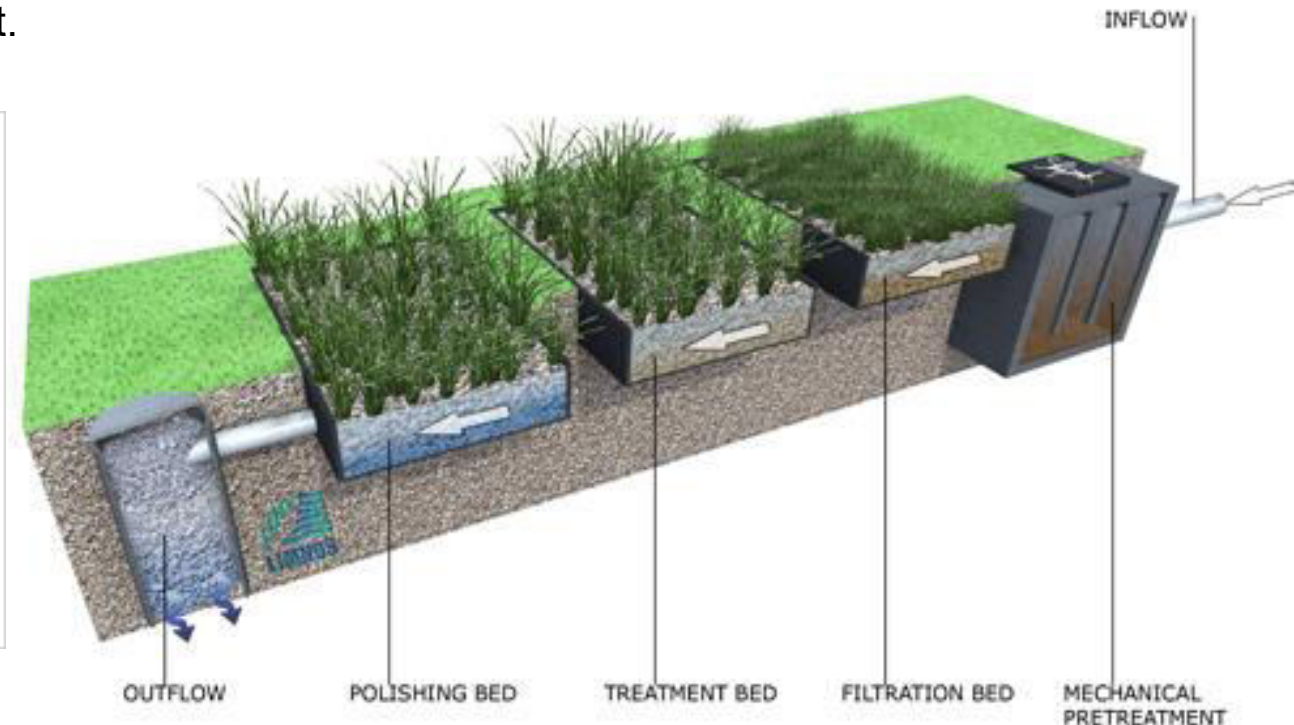


STAGES

- There shall be chambers constructed in a **gravitationally declining pattern** starting from the **screen chamber** and finishing at **treated water collection tank**.
- The Water pump will be required to pump out Water which would be supplied to the primary chamber. An array of Water pumps shall be required to pump the Water in a uniformly distributed manner in to the Constructed Wetland beds.
- The submersible Water positive displacement pumps would be required to pump the Water to the desired head of 3-4 meters from the main Water flowing pipeline. A combination of these or couple of large capacity pumps shall be required to distribute the Water into the media and filter beds for treatment.



Basic idea of Constructed wetland technology.



Chambers constructed in gravitationally declining pattern

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