

CONSTRUCTED WETLAND

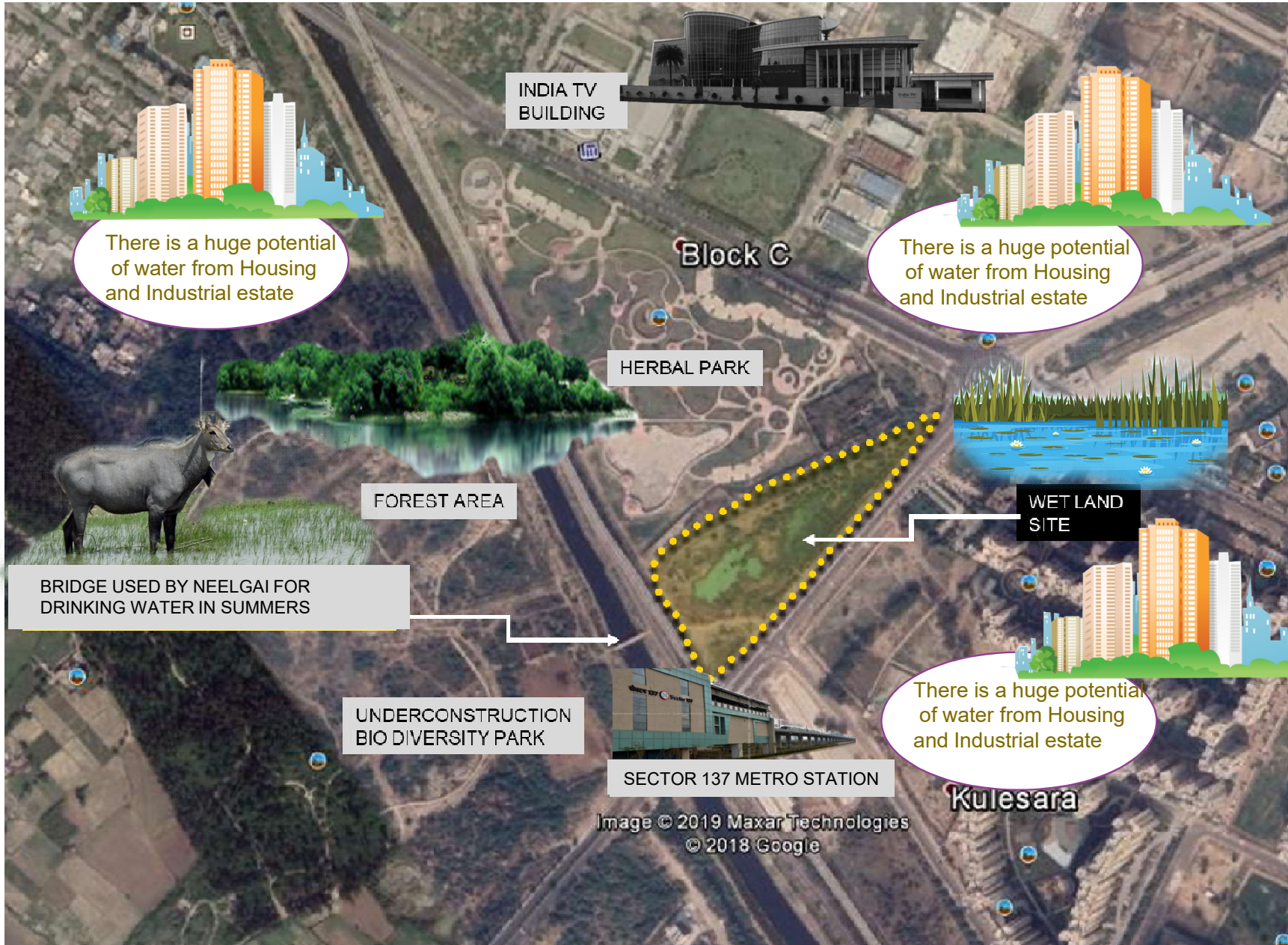
SUSTAINABLE INTEGRATED DEVELOPMENT
SECTOR 91, NOIDA

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INDIA TV BUILDING

Block C

HERBAL PARK

FOREST AREA

WET LAND SITE

BRIDGE USED BY NEELGAI FOR DRINKING WATER IN SUMMERS

UNDERCONSTRUCTION BIO DIVERSITY PARK

SECTOR 137 METRO STATION

There is a huge potential of water from Housing and Industrial estate

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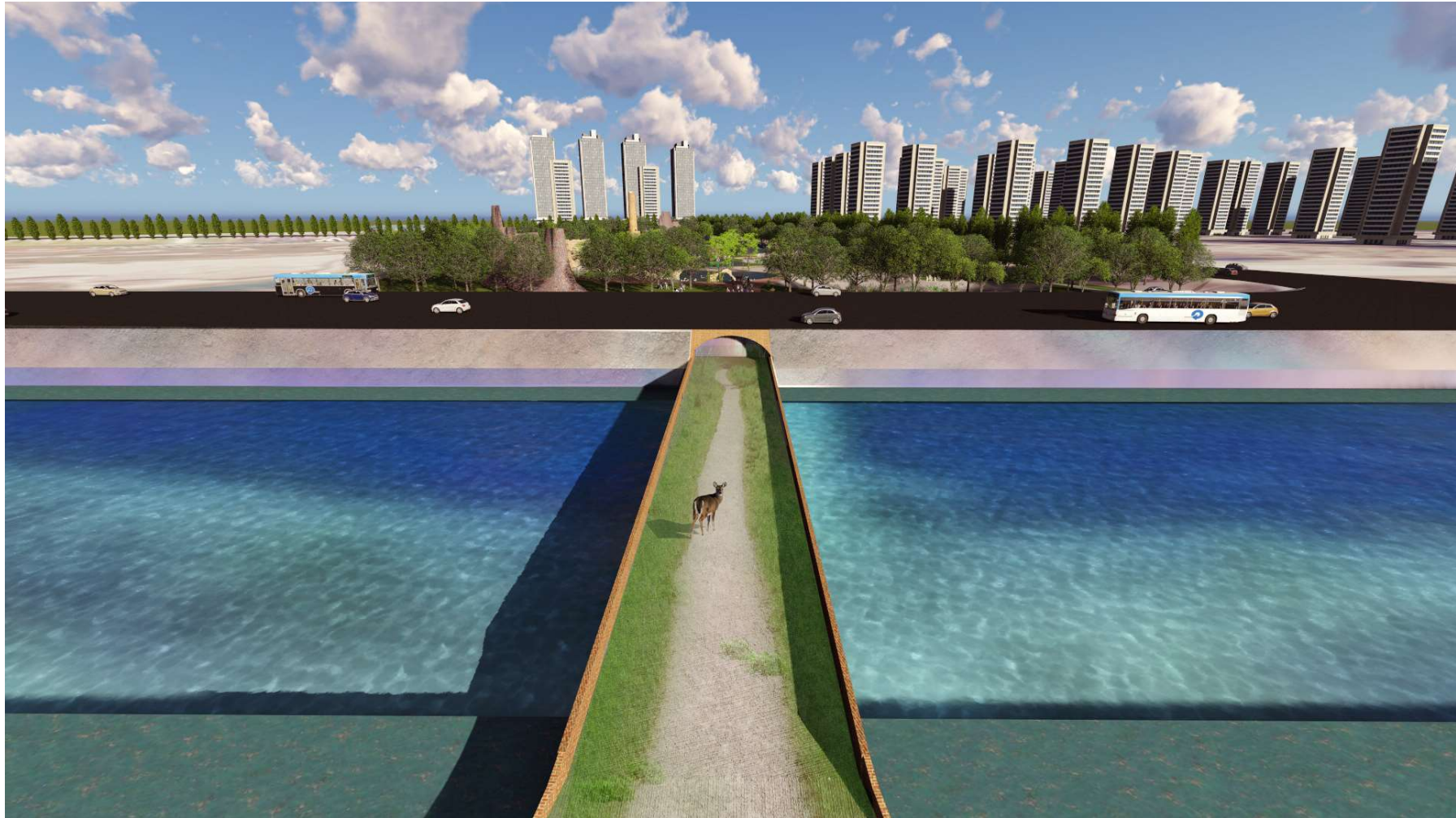
There is a huge potential of water from Housing and Industrial estate

Kulesara

Image © 2019 Maxar Technologies
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VIEWS OF THE SITE



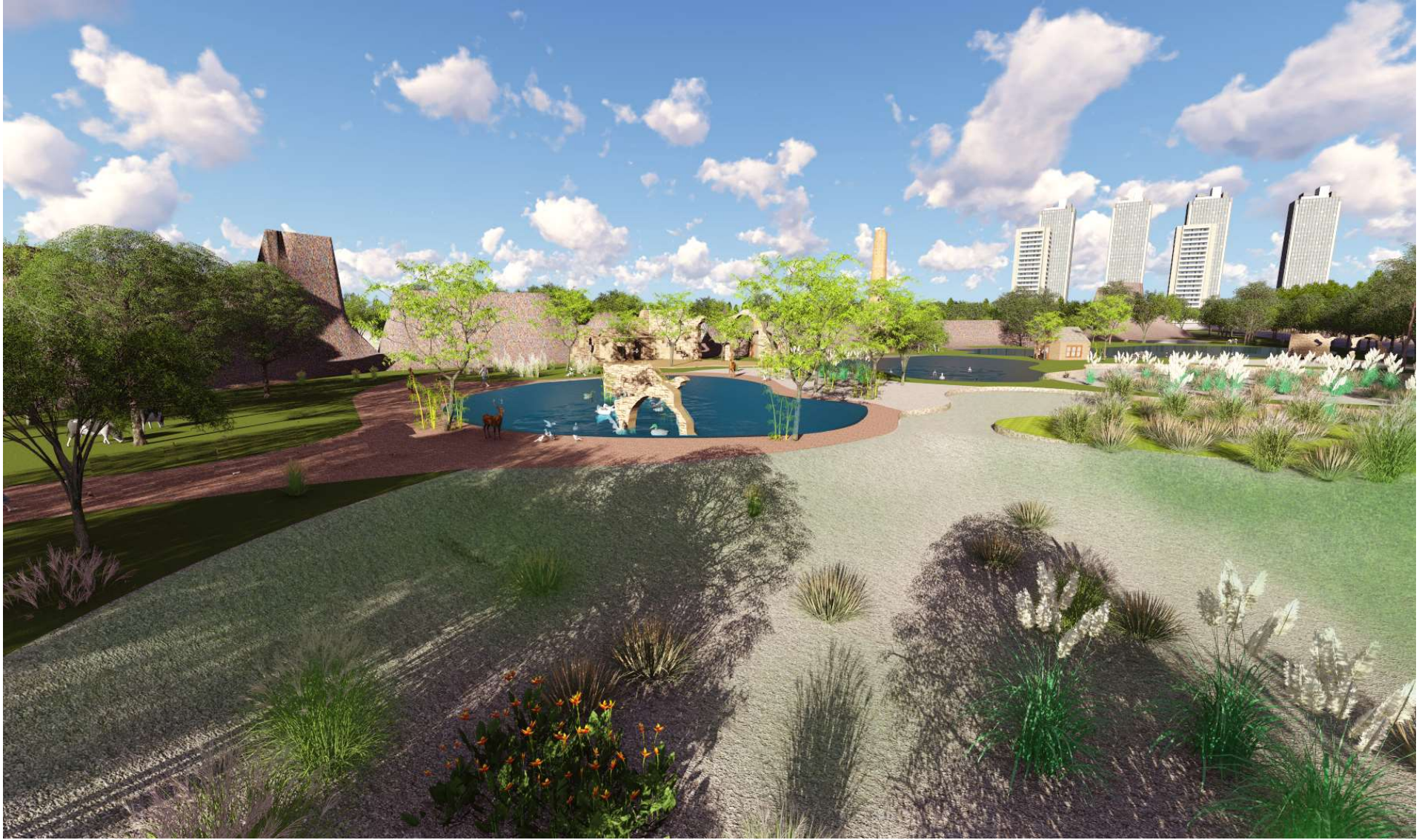
UNDERPASS FOR NILGAI AND OTHER ANIMALS LIVING IN NEARBY BIODIVERSITY RESERVE



FRESH WATER POOL: GATHERING SITE OF ANIMALS AND BIRDS



SUBMERGED STRUCTURES IN POOL TO GIVE A MORE NATURAL LOOK



PERCOLATION BEDS GROWING WATER CANNA PLANT



PERCOLATION BEDS



PERCOLATION BEDS GROWING PLANTATION



WALKTHROUGH

Layout



Percentage of growth is shown in intensity of colour

After 6 Months

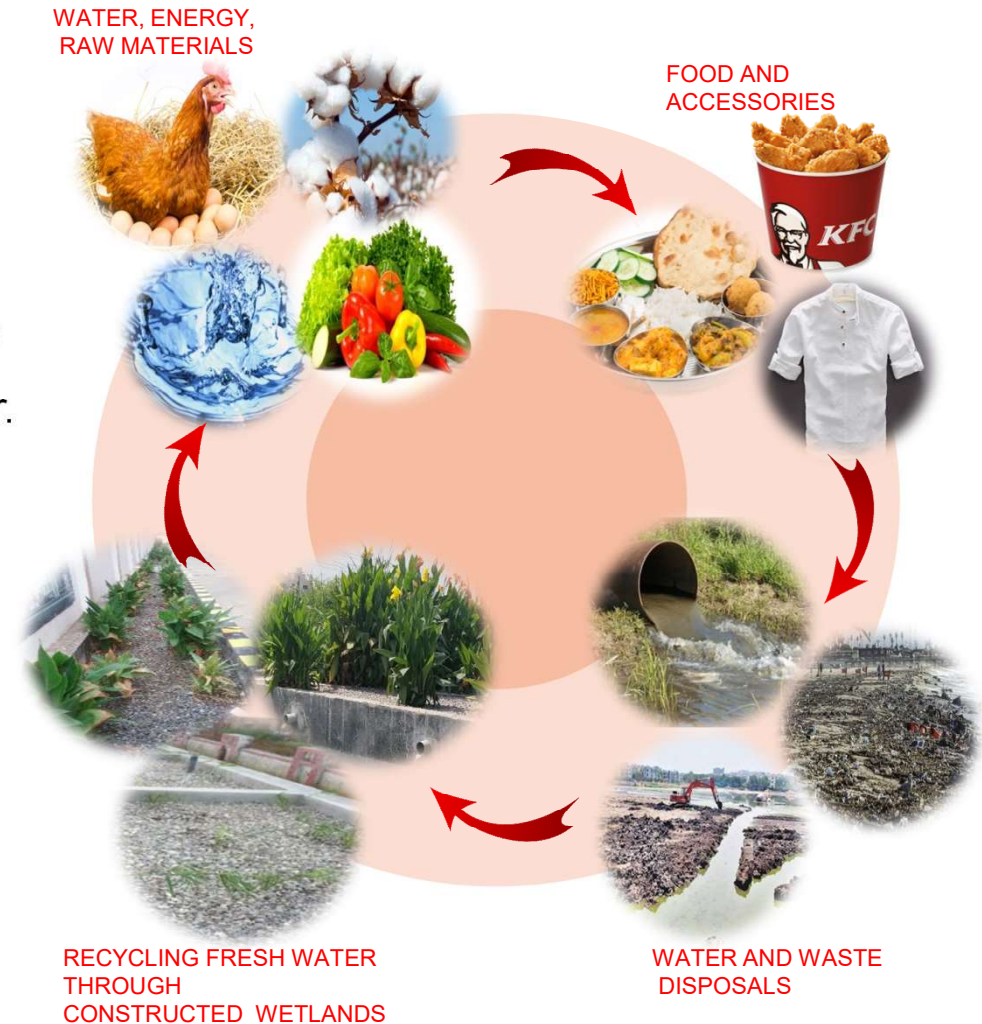
Our Approach

Any Architect, Urban Designer, Landscape designer should consider energy, maintenance and waste management as of prime importance.

1. Our learning is that the environment should be designed as a cyclical chain and one requirement should fulfill the other.

We need resources (like water and energy); our living creates waste and from that waste, we create resources.

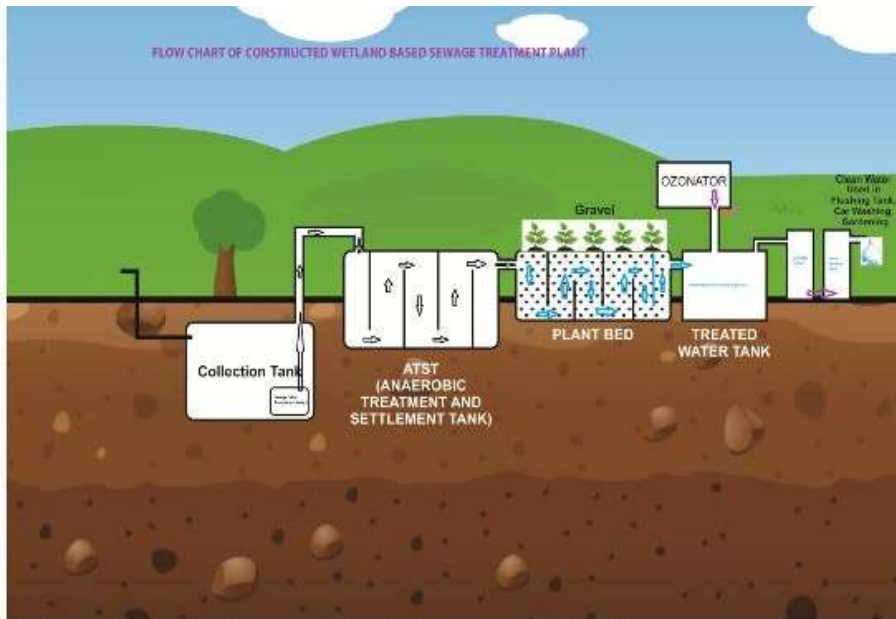
2. Wetlands are the most efficient ways of cleaning water, if one has land. Odour, mosquitoes and swamps can be avoided.
3. The proposed landscapes are constructed wetlands, but they will appear as natural, not constructed.



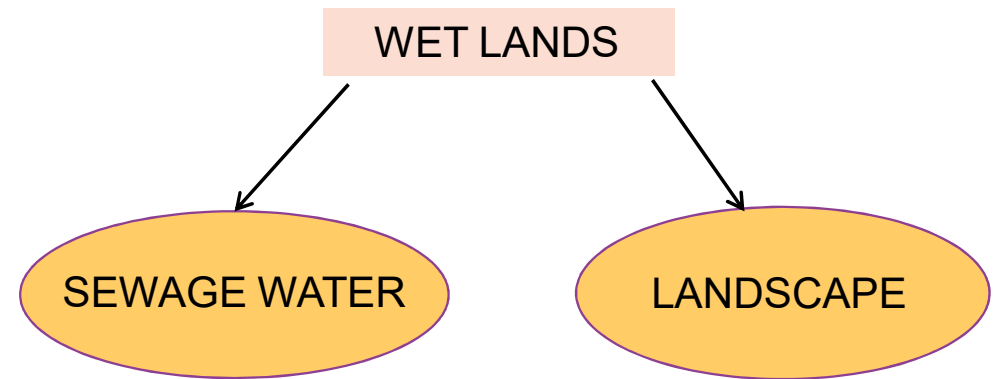
Constructed Wetlands

Points to consider

Constructed Wetlands are great systems to treat waste water primarily from residential areas . There will be chambers constructed in a gravitationally declining pattern starting from the screen chamber and finishing at treated water collection tank. 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.



Flow chart of Constructed wetland Sewage Treatment Plant.



The system is 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. can also be used for treatment as well as landscaping purposes.

These plants have a peculiar quality of pumping in oxygen (procured from atmosphere) into the water which in turn increases the dissolved oxygen content of water and results in reduction of BOD and COD.

The system has few advantages such as , it is odorless, requires minimal energy and operations . The system also has a range from 5 %-110% of treating its full capacity . That means even if the amount of waste water is less (5% of the full capacity , it will function properly which is generally not seen in other conventional methods. Also this system provides treated water on a daily basis and the cleaning and disposal takes place once in a year.

EARLIER CONSTRUCTED WETLANDS PROJECTS :

RUDRA HEIGHTS, VARANASI(100 KLD)



NRI CITY, KANPUR, (100 KLD)



MEGA ESTATE,LUCKNOW(135KLD)



We have used constructed wetlands technologies in these places which are working perfectly as per its mechanisms of treating waste water. And its advantages of being an odourless system of sewage treatment, less consumption of electricity and low maintenance is getting positive impacts from its recent users.

NET OBJECTIVES

1. Clean water to be used for irrigation for 1000 KLD and purifying parameters set by the removal efficiency of organic matter, phosphorous, nitrogen, suspended solids etc.
2. Water harvesting.
3. Use locally available flora like elephant grass, cattails, reeds, cannas pp. and yellow flag iris which are usual wetlands plants etc. and protect existing fauna like Nilgai, Brown Indian Hare, Mongoose of the region.



Local flora like yellow flower iris is proposed to be used and protect fauna like Nilgai

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

4. Have vegetation that can handle toxicity against tannary, food factories, clothing manufactures and machinery industries that eliminate chemicals like formic acid, citric acid, monosodium gultimate, glycol, iron dust and cotton dust.
5. 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.

SITE FEATURES

1. The existing bridge connects 3 sides with movements of Neelgai coming to wetland. Even if that is not visible always, this itself have an impact to popularise the area as Ecotourism zone.
2. Unobstrusive ruins created out of construction waste will aid in attracting migrating birds, providing privacy.



Ruin forts as a point of attraction.



Bridge for higher mammals for being able to drink water.

3. POINT OF ATTRACTION- a strong element like ruin structure, leaning minarets will have a great impact not only to the vicinity but also to the people travelling by metro and popularise the area.
4. Delhi has the largest number of migrating birds in the world after Nairobi. It ranks 4th in the world for migrating birds hub.

METHODOLOGY

- ❖ 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).

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3



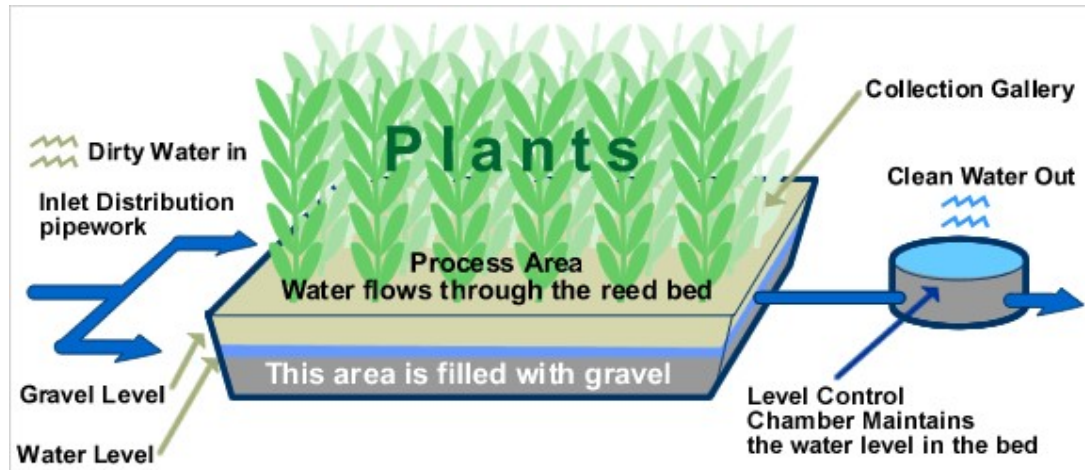
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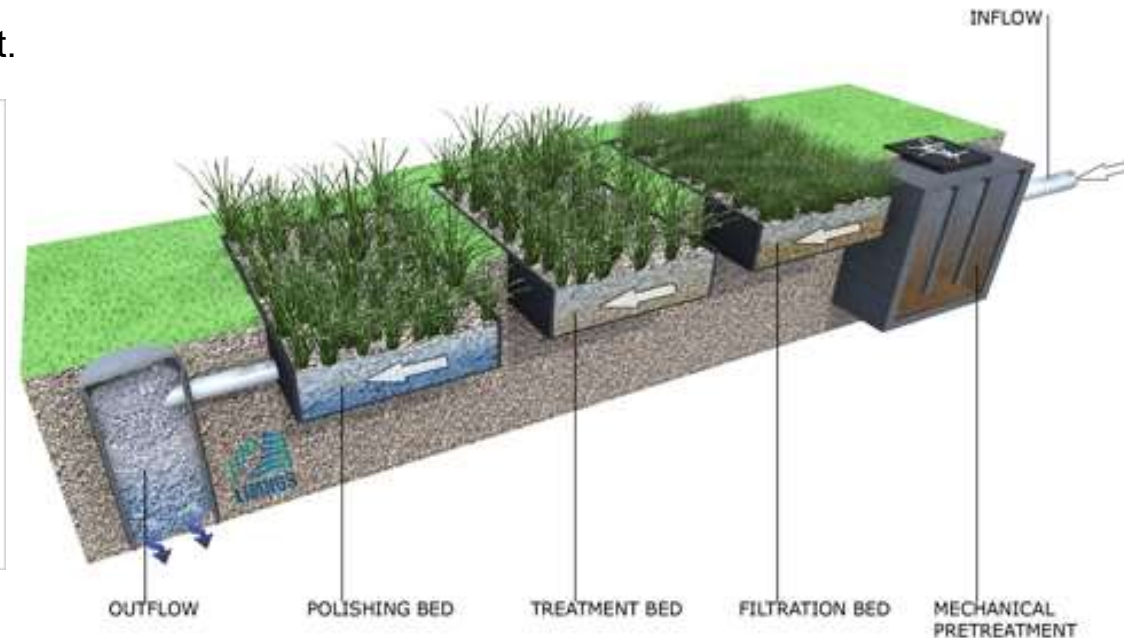
STAGES

METHODOLOGY

- 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

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**.

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