

Towards Net-Zero in Water, Energy, & Waste

|| ParashurAma BasavEshwara akshya kshEtra ||



ಭಾರತೀಯ ತಂತ್ರಜ್ಞಾನ ಸಂಸ್ಥೆ ಧಾರವಾಡ
भारतीय प्रौद्योगिकी संस्थान धारवाड
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Green Initiative Committee, IIT dhArwAD

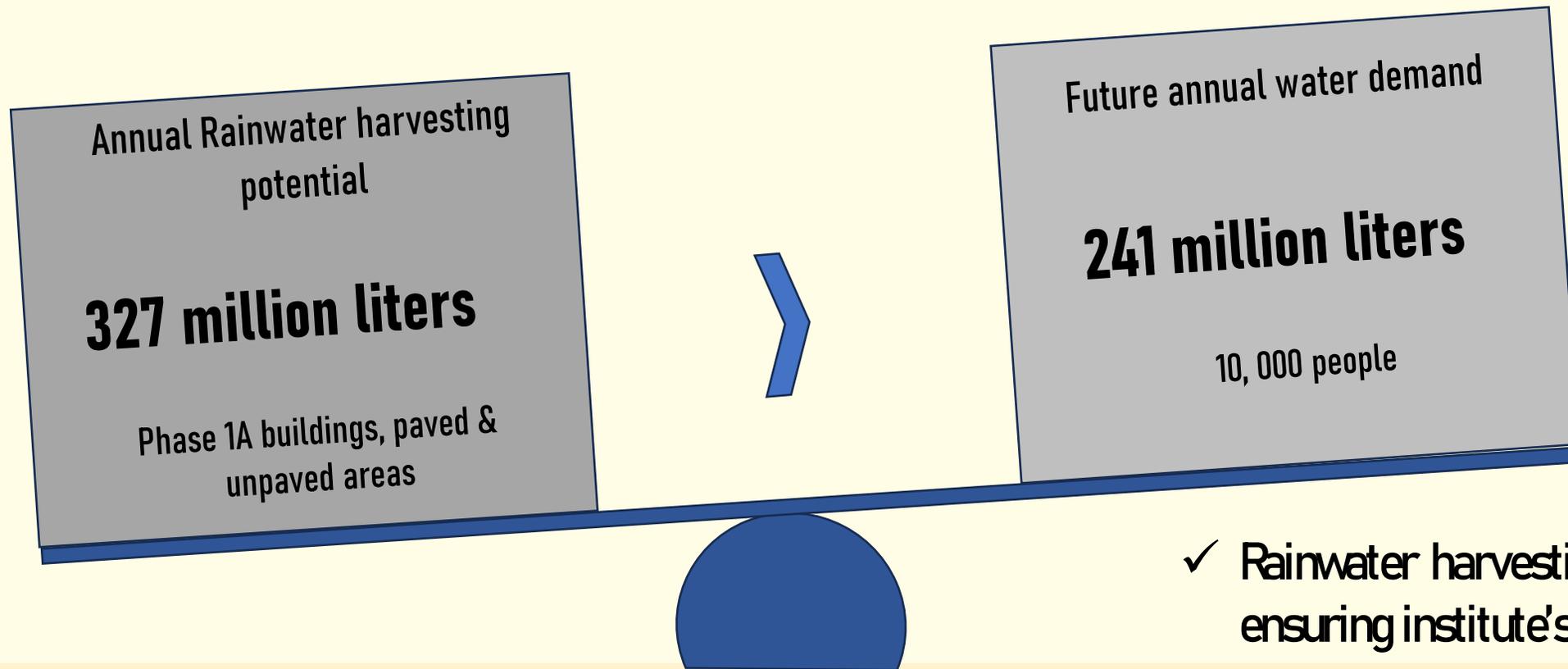
IIT DHARWAD Masterplan



GRIHA LARGE DEVELOPMENT MASTERPLAN RATING
GRIHA (Green Rating for Integrated Habitat Assessment)

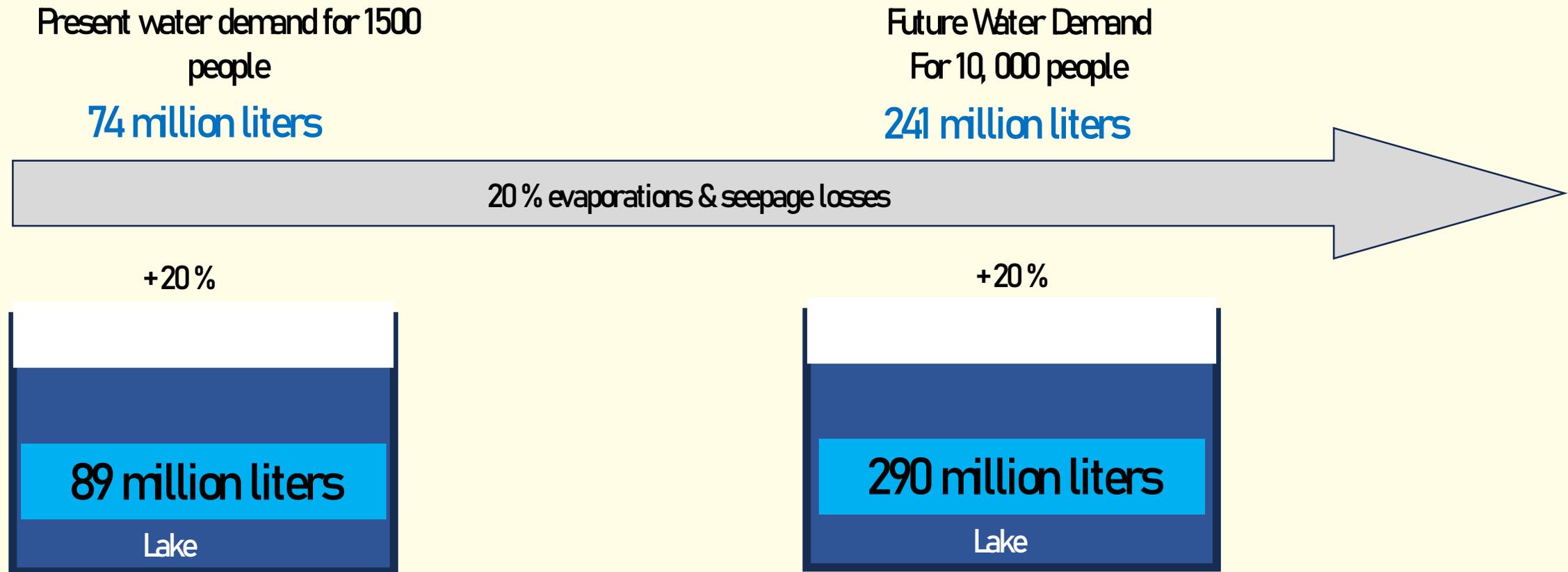
Net-Zero in Water

FEASIBILITY:



✓ Rainwater harvesting is a viable option for ensuring institute's water security.

STORAGE CAPACITY:

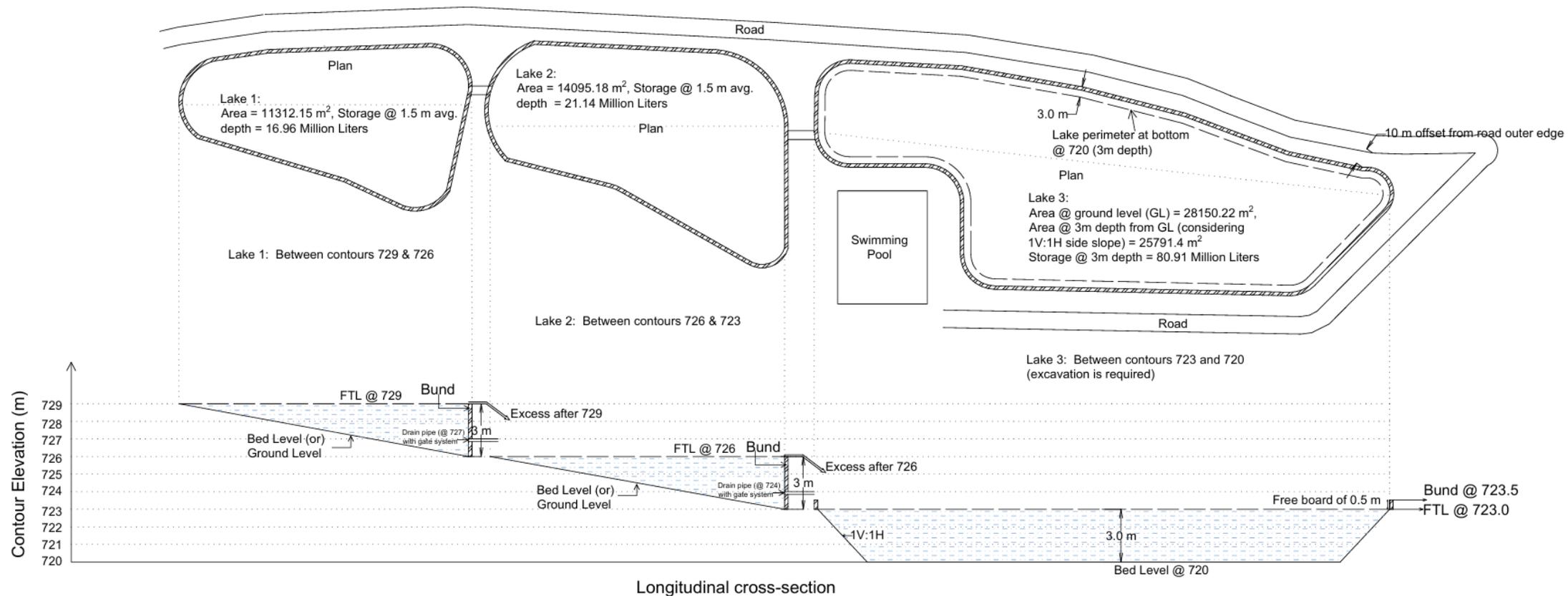


PROPOSED LAKES STORAGE CAPACITY ASSESSMENT :

- Three lakes are arranged in a cascade pattern.
- Total storage capacity is approximately 119.0 million liters



Fig. 1. Lakes as highlighted on the master plan of IIT dhArwAD



CAPACITY:

	Area	Depth (m)	Volume (million liters)
Lake 1	11312.15 m ²	1.5 m (avg.)	16.96
Lake 2	14095.18 m ²	1.5 m (avg.)	21.14
Lake 3	28150.22 m ²	3 m	80.91
			119.0 million liters

Net-Zero in Energy

Reduce Energy Demand

- Passive solar design
- Efficient lighting & appliances
- Efficient exterior envelope



- Renewable resources (Solar, Wind, and Geothermal)

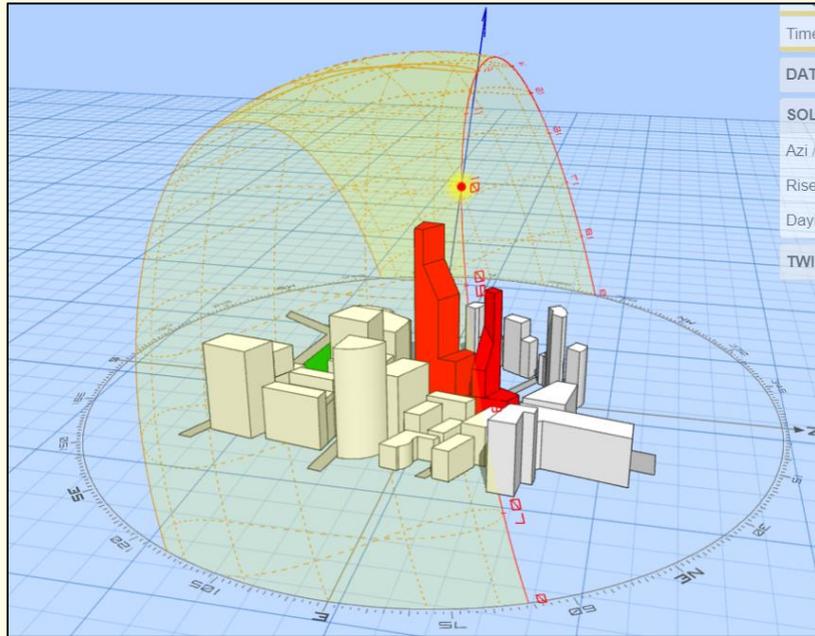
Onsite Energy Generation

Onsite energy generation = Total energy consumption onsite



Reduce Energy Demand (Heating, Cooling, Daylighting)

- Climate Responsive Design



Sun-path during different months.



Prevailing wind movement: North West - South East.

	January	December
Avg. Temperature (°C)	22.3	21.9
Min. Temperature (°C)	15.3	15.5
Max. Temperature (°C)	29.4	28.4
Precipitation / Rainfall (mm)	0	7

Average temperature varies during the year by 6.1 °C.

- Based on the solar and wind analysis the orientations of different buildings were established.

- **Passive Solar Architecture**

- ❖ **Maximize utilization of daylighting**
(minimum 50 % areas daylit with adequate illuminance)

- ❖ **Optimization of solar heat gain**
 - ✓ Adequate shading devices (thermal barrier & overhangs)
 - ✓ High-performance glass
 - ✓ ECBC 2017 guidelines

- ❖ **Natural Ventilation**
(improved indoor air quality)



Onsite Energy Generation

- Rooftop Photovoltaic system (approved)
 - ✓ A 1.80 MW rooftop solar PV system is approved to meet the campus's annual energy needs, bringing it closer to net-zero energy status.
 - ✓ Payback period around 4 years.



Ref. <https://www.shutterstock.com/search/commercial-solar-panels-rooftop>

Net-Zero in Waste

Segregation:

- Green for compostable/biodegradable waste and blue for non-compostable/non-biodegradable waste. Red bins for landfill waste.
- Recycling stations (prevent bins from being toppled by stray animals).
- Waste segregation at different locations.

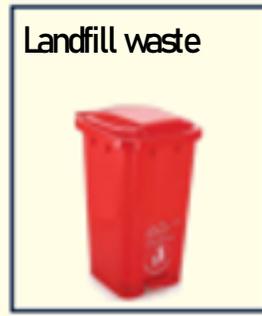
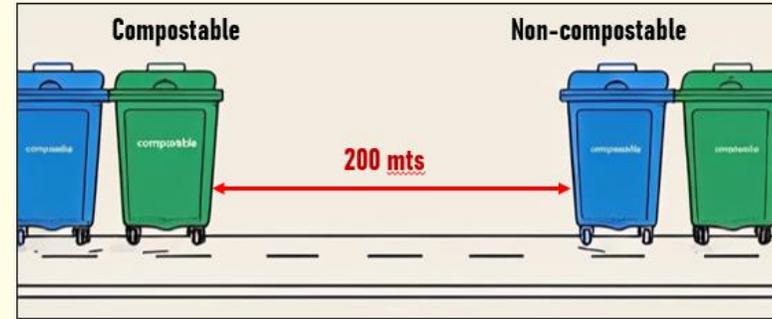
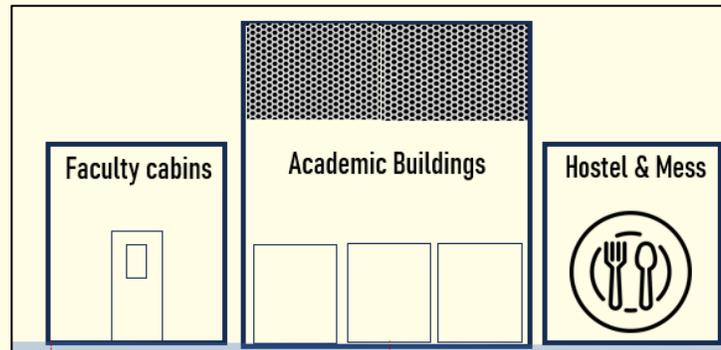


Fig.3. Recycling stations.



Liquid Waste Management

Phytoid wastewater treatment system

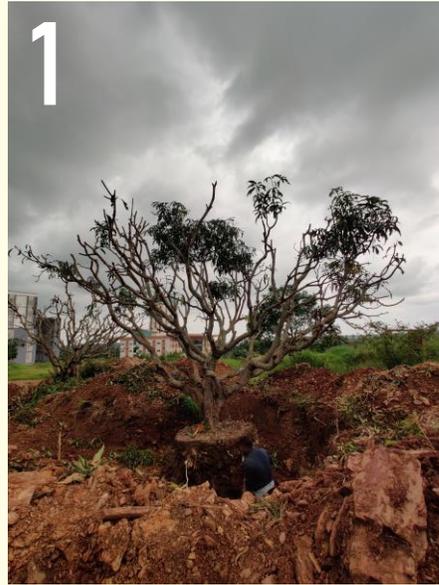
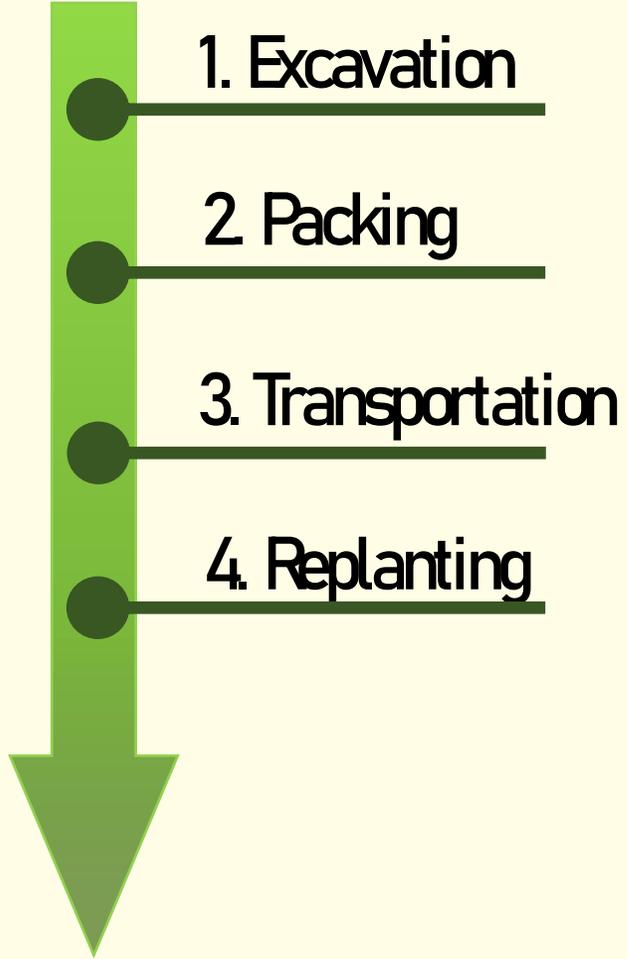
- Capacity: 150kld
- Plants: *Cyperus alternifolius* Lilli, *Cana Indica*



Fig.4. Phytoid wastewater treatment system at IIT Dharwad.

Other Green Initiative:

- Tree Transplantation



Future Green Initiative:

- Kitchen waste Biogas Plant
- Composting system
- EMobility
- Heat Pump-Solar Hybrid water heater

Proposals in Progress:

- **Rooftop Photovoltaic system**

A 1.25 MW rooftop solar PV system is approved to meet the campus's annual energy needs.



Ref. <https://www.shutterstock.com/search/commercial-solar-panels-rooftop>

- **Construction of lakes for rainwater harvesting**

The construction of lakes has been proposed to ensure the present and future water demand of the campus.



Fig.2 Proposed lakes as highlighted on the master plan of IIT Dharwad.

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Thanks!



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