

Nālandā
UNIVERSITY

Net Zero Campus



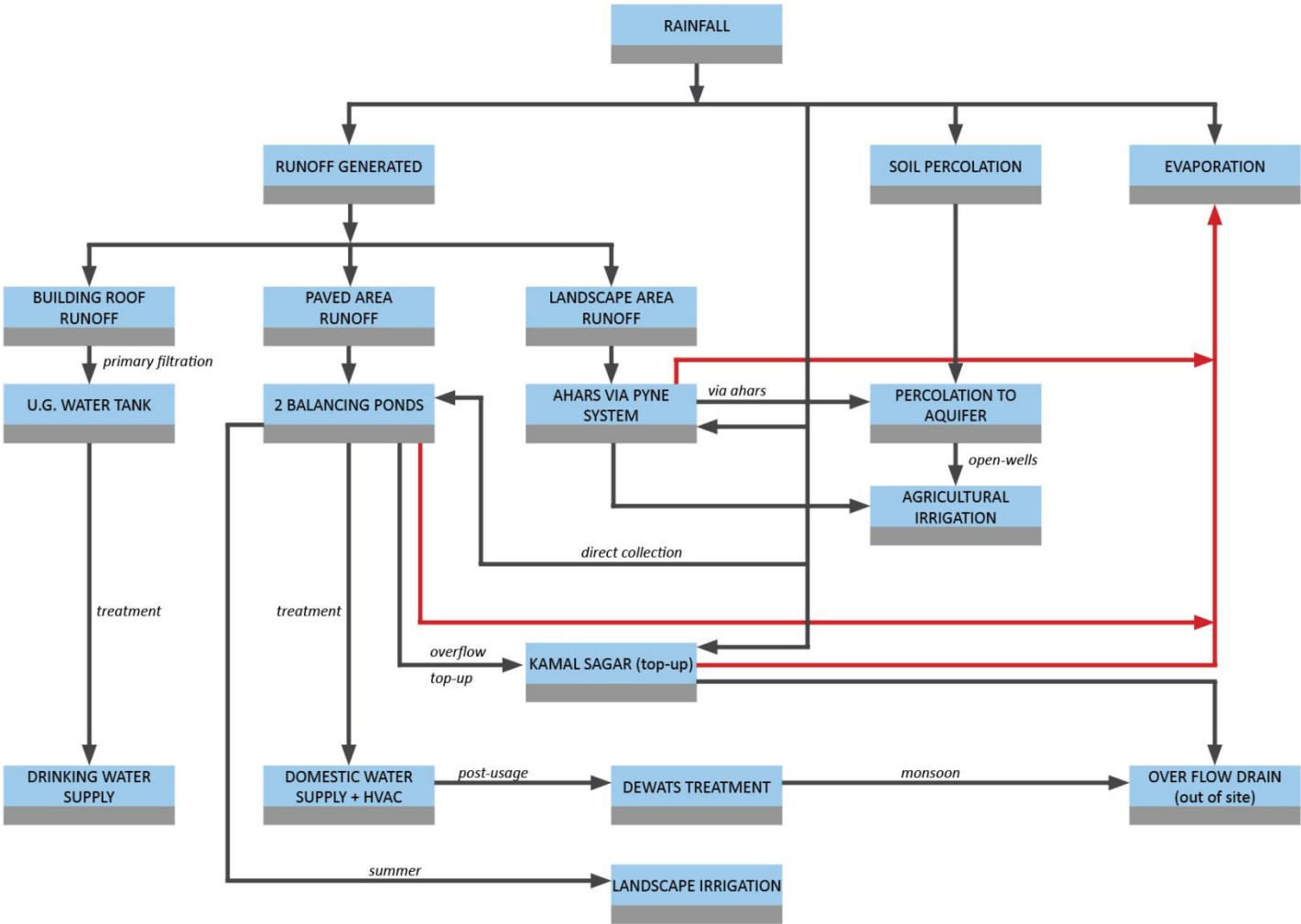
Site Levels

1. HFL : 100MT
2. Avg. Existing ground level : 99.75Mt
3. Avg. Highway Level : 100Mt
4. Max. Water Level in Kamal Sagar : 100.5 Mt
5. Top of Campus Amenities Walkway : 100.8 Mt
6. Finished Road Level : 101.1Mt
7. Promenade and Pathway/Footpath Level : 101.25Mt
8. Building Inside Plinth : 101.85 Mt
9. Highest level of Academic Building : 119.85Mt

ESTABLISHING A WATER SYSTEM ON SITE

Water cycle on site is designed to be resilient against flooding and drought both. Runoff generated from roof tops shall be stored in underground tanks for drinking purpose. Runoff generated from all other surfaces in built areas shall assimilate in Kamal Sagar and its balancing tanks via a system of open and piped drains. Runoff generated in remaining part of the site shall be assimilated in ahars for storage and percolation.

Water from Kamal sagar and balancing tanks shall be used for domestic demands. Water in ahars shall be used for irrigating plantation and experimental agriculture farms. In case of scarcity, open wells shall supply to deficit water demand. Waste water from domestic uses shall be treated via decentralized waste water treatment system (DEWATS) and used for irrigation of intense landscape around built areas.



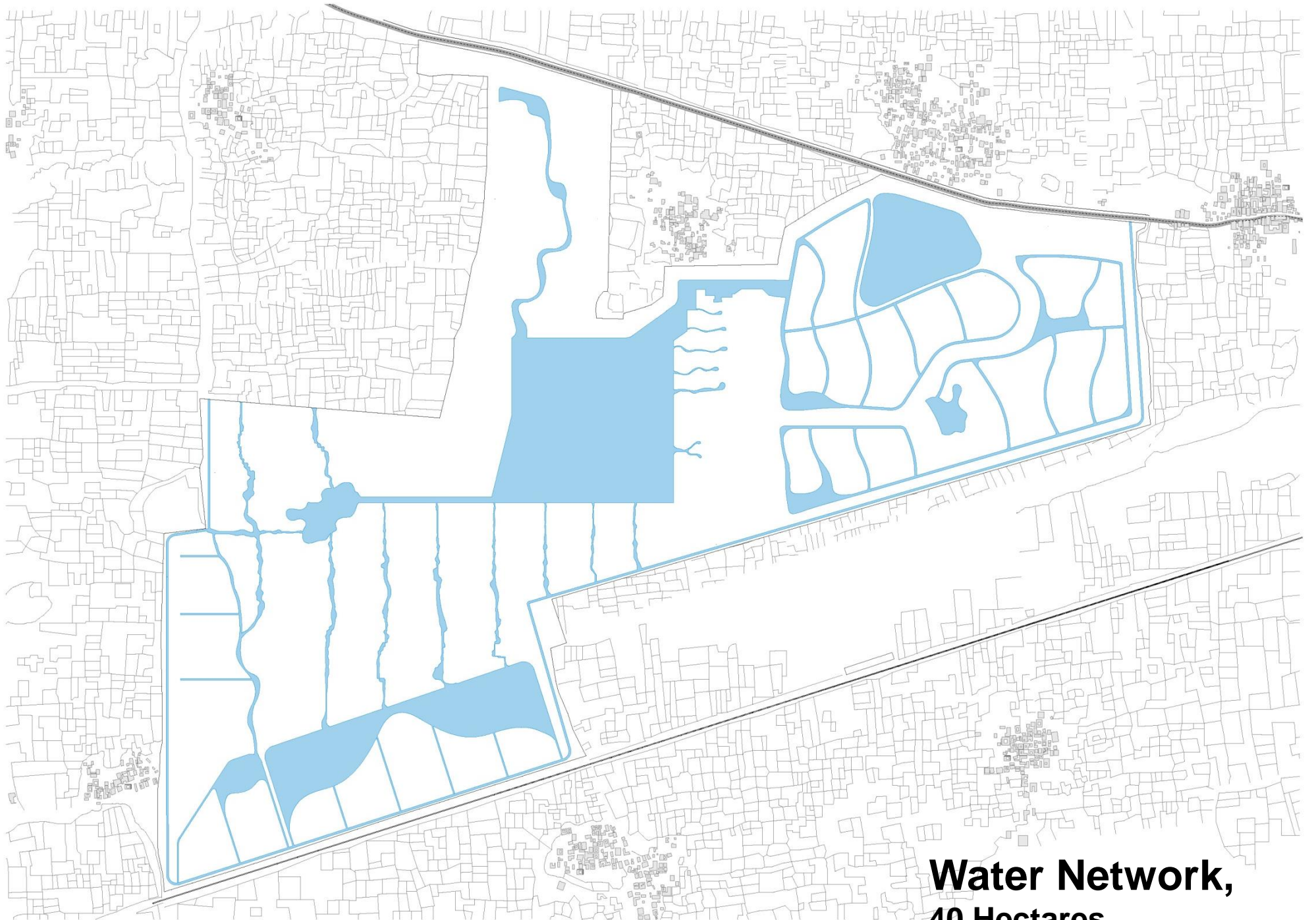
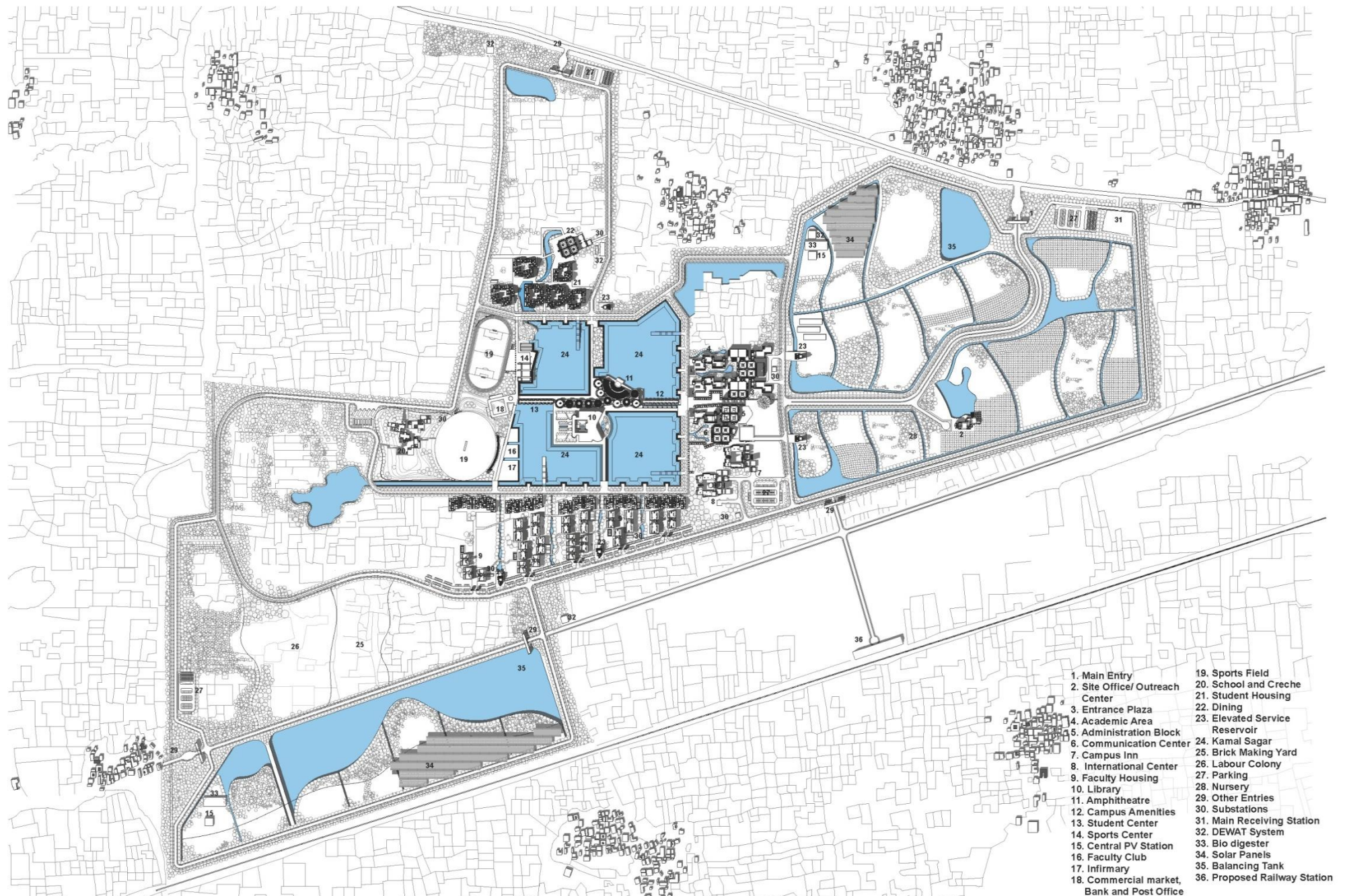




Figure Ground
Ground coverage 8 %



Overall Masterplan, BUA - 3,66,811 Sq.mts



Phase 1 Masterplan, 1,28,404 Sq.mts

- | | |
|---|--------------------------------|
| 1. Main Entry | 19. Sports Field |
| 2. Site Office/ Outreach Center | 20. School and Creche |
| 3. Entrance Plaza | 21. Student Housing |
| 4. Academic Area | 22. Dining |
| 5. Administration Block | 23. Elevated Service Reservoir |
| 6. Communication Center | 24. Kamal Sagar |
| 7. Campus Inn | 25. Brick Making Yard |
| 8. International Center | 26. Labour Colony |
| 9. Faculty Housing | 27. Parking |
| 10. Library | 28. Nursery |
| 11. Amphitheatre | 29. Other Entries |
| 12. Campus Amenities | 30. Substations |
| 13. Student Center | 31. Main Receiving Station |
| 14. Sports Center | 32. DEWAT System |
| 15. Central PV Station | 33. Bio digester |
| 16. Faculty Club | 34. Solar Panels |
| 17. Infirmary | 35. Balancing Tank |
| 18. Commercial market, Bank and Post Office | 36. Proposed Railway Station |



View from the Nalanda Plaza



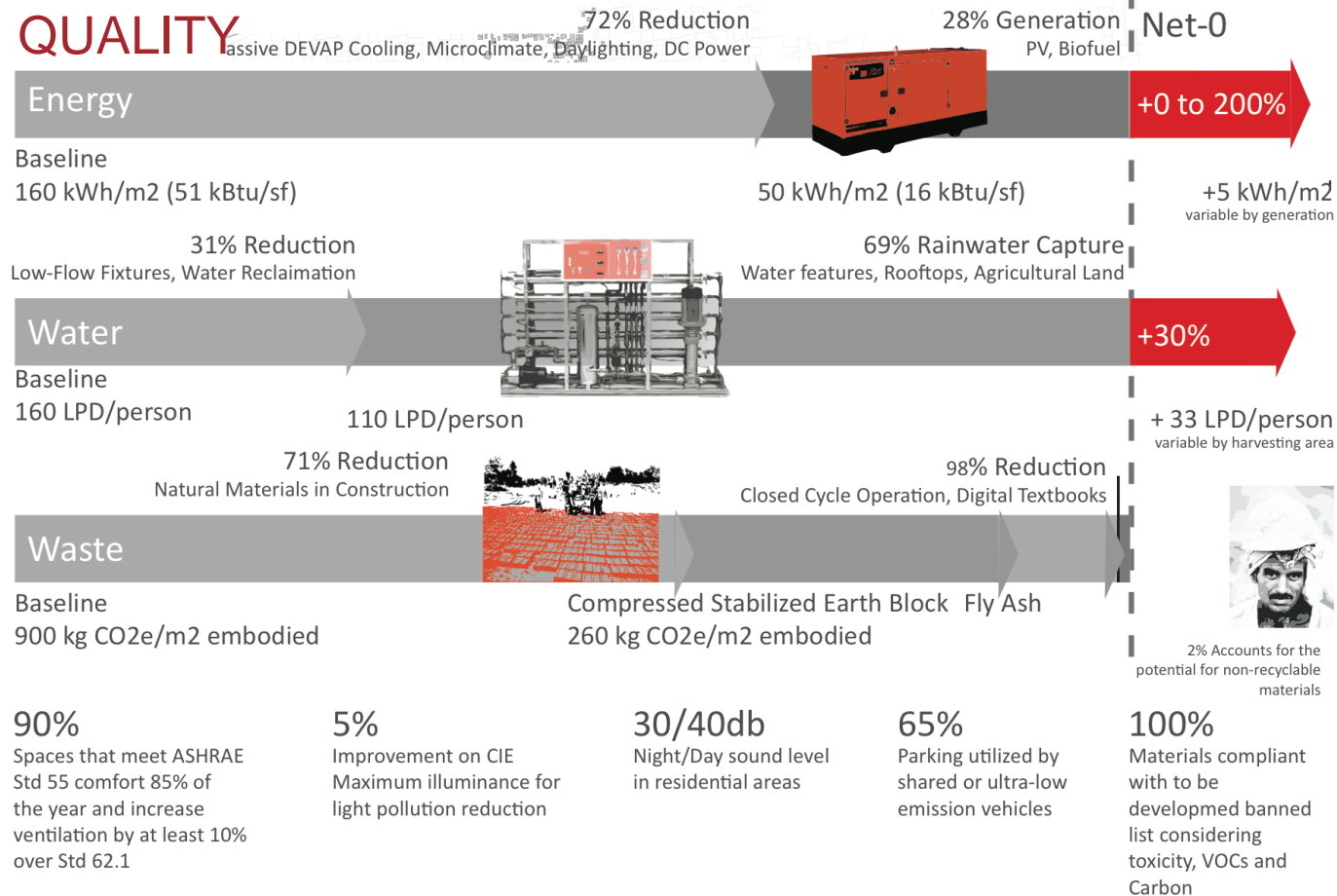
View of the Acedemic Spine from Kamal Sagar

NET ZERO - ENERGY, WATER, WASTE

1. NET ZERO APPROACH

NET-ZERO LIVING PLAN

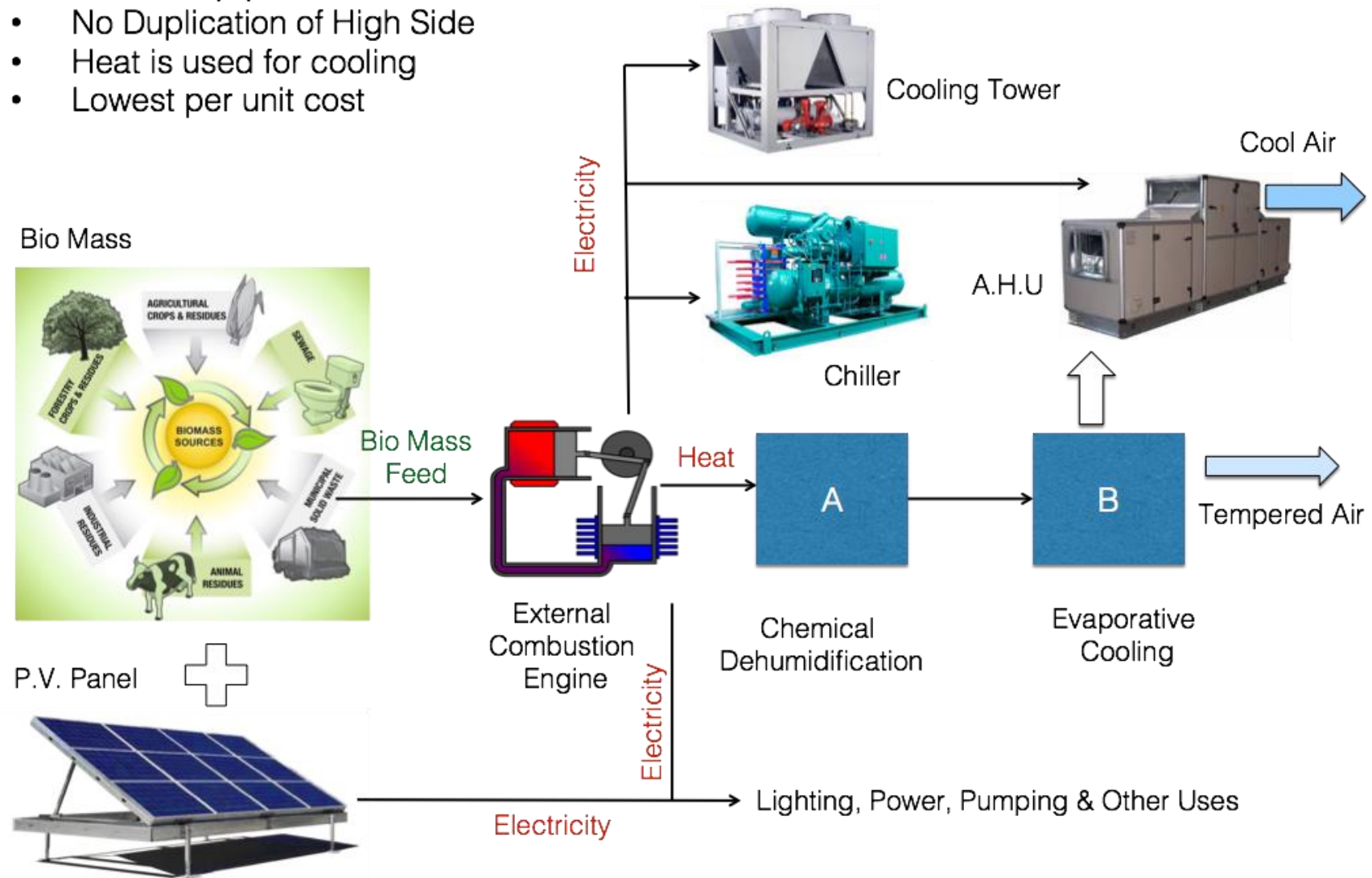
ANALYZING THE CARRYING CAPACITY OF THE SITE AND QUALITY



Energy

DEVAP Approach

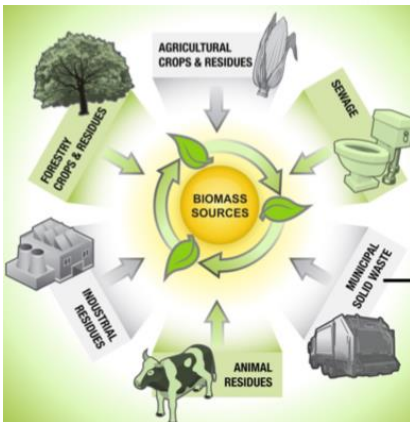
- No Duplication of High Side
- Heat is used for cooling
- Lowest per unit cost



BIO MASS POTENTIAL

A few km radius

45 MT/peak
day



Nalanda Stats per Day

1000 people/sqkm = 230 kg/sqkm

100 buffalo/sqkm = 3000 kg/sqkm

200 bovine/sqkm = 9000 kg/sqkm

100 goats/sqkm = 400 kg/sqkm

50 chickens/sqkm = 5 kg/sqkm

10 pigs/sqkm = 60 kg/sqkm

Approximately 12700 kg/sqkm

- Wheat Husk (April & May)
- Split Red Gram (April & May)
- Rice Husk (October & November)
- Millet (October & November)
- Sesame (October & November)

BIO MASS POTENTIAL

BIO GAS ONGOING PROJECTS



Saran Renewable Energy Pvt. Ltd.



Current Projects

- **Rural power plants across Bihar and UP**

SRE is setting up 100 small rural power plants totaling 3MW across Bihar and UP. We have set up 5 small plants which cater to more than 3,500 customers.

We are looking for support from people having roots in villages of Bihar and UP to come forward and help us set up these power plants in their villages.

Please write to us at saranrenew@yahoo.co.in or sanjay@saranrenew.in

Future Plans

- **Biomass plants across India**

SRE plans to set up small and large biomass based power plants across India. We are currently exploring projects in East/ North East India - Jharkhand, Meghalaya and Sikkim

- **Sitalpur, Saran**

Saran Renewable Energy Pvt. Ltd. is in the process of setting up a 5MW biomass combustion based power plant at Sitalpur.

<http://www.saranrenew.in>

BIO MASS POTENTIAL



Location

Village Gawnah, West
Champaran District, Bihar

Plant Capacity

1 x 12 MW

Plant Configuration

60 TPH Boiler

13.5 MW Condensing STG

Fuel

Rice Straw, Wheat Straw, Rice
Husk



Location

Village TBD, Buxar District, Bihar

Plant Capacity

1 x 12 MW

Plant Configuration

60 TPH Boiler

13.5 MW Condensing STG

Fuel

Rice Straw, Wheat Straw, Rice Husk



Location

Village TBD, Bhojpur District, Bihar

Plant Capacity

1 x 12 MW

Plant Configuration

60 TPH Boiler

13.5 MW Condensing STG

Fuel

Rice Straw, Wheat Straw, Rice Husk



Location

Village TBD, Rohtas District, Bihar

Plant Capacity

1 x 12 MW

Plant Configuration

60 TPH Boiler

13.5 MW Condensing STG

Fuel

Rice Straw, Wheat Straw, Rice Husk

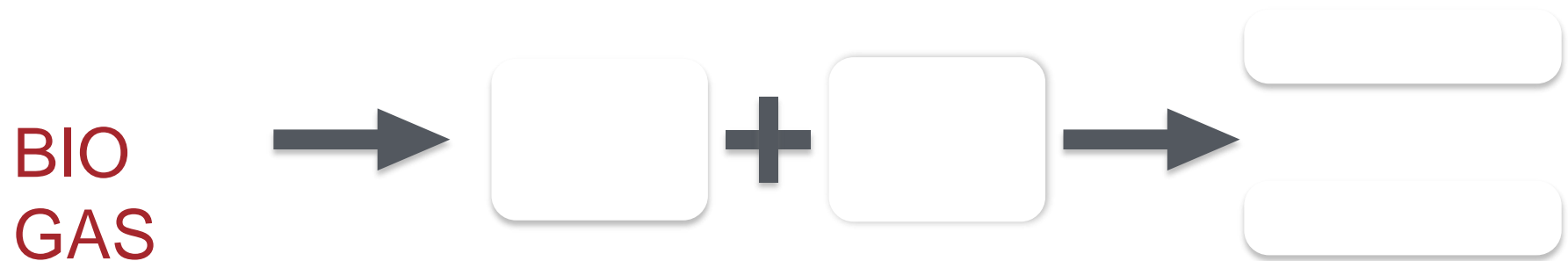
OPTION 1

**BIO
MASS**



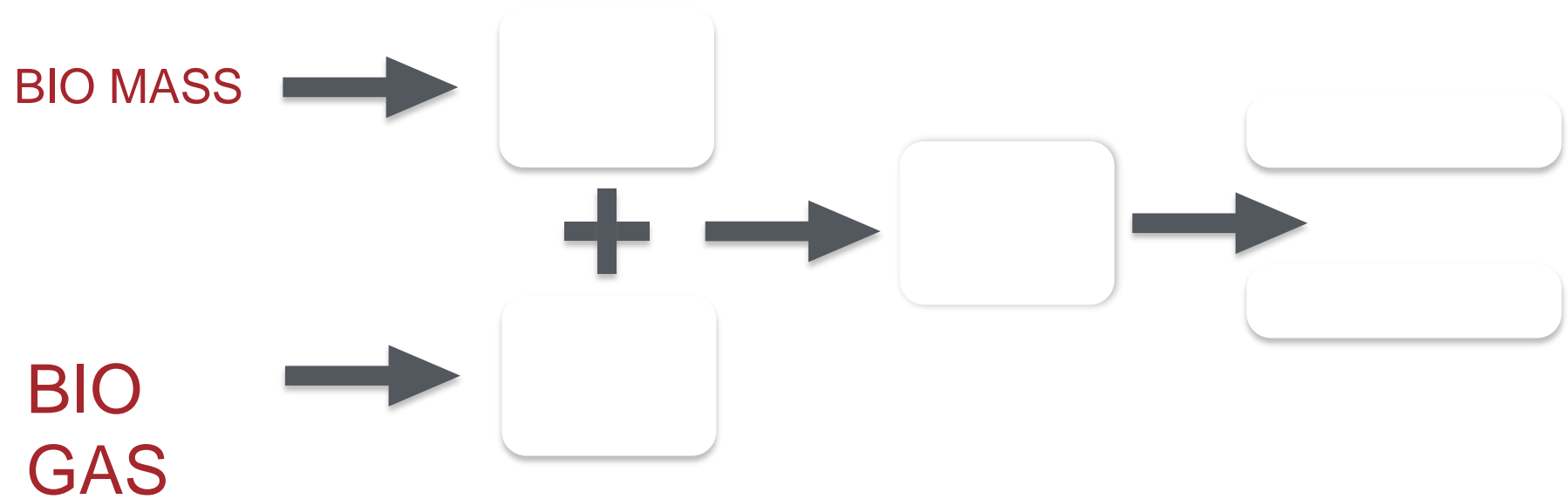
- Organic Waste (From Adjacent City)
- Rice Husk (From region)
- Wheat Straw (From region)
- Wood Chips (From region)
- Split Red Gram (April & May)
- Millet (October & November)
- Sesame (October & November)

OPTION 2



- Organic Waste (From Adjacent City + Campus)
- Sewage (From Adjacent City + Campus)
- Chicken Manure (From nearby poultry farms)
- Cow Manure (From surrounding area)

OPTION 3



NO MAINTENANCE STIRLING ENGINE AND MODULAR BIOSTORAGE PLANT

ENGINES CAN RUN OFF ALMOST ANY FUEL SOURCE

30 W/m² FLOOR AREA RATIO

1.5 MWp (200 @ 7.5 kWp each)

ANNUAL GENERATION: 4000 MWh/yr

EST. CAPITAL COST OF SYSTEM: 18 CRORE (3 MUSD)

EST. LIFESPAN W/O MAINTENANCE: 70,000 hrs

ENERGY IS STORED AS BIOFUEL

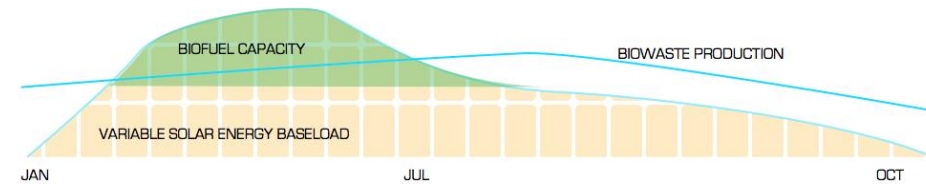
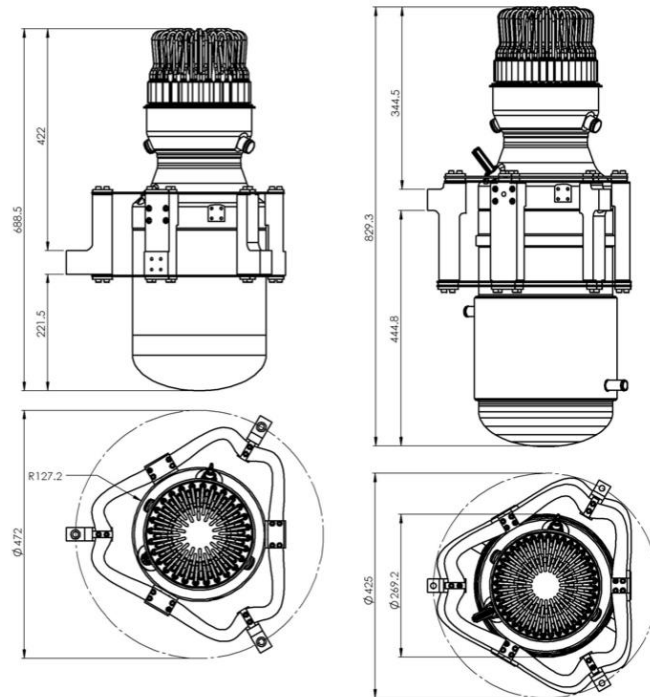
ANNUAL FUEL CAPACITY: 15,000 MWh/yr

ANNUAL FUEL VOLUME: 2.5 MMLpY (.7 MMGpY)

ESTIMATED LAND: 500-1000 acres

EST. CAPITAL COST OF SYSTEM: 18 CRORE (3 MUSD)

ANTICIPATED UTILITY COST INCL O+M: 1.8 Rs/kWh (3 cents/kWh)



Demand: Phase 1

Phase 1 Load Calculation

Bio-Mass				BIO-GAS				
Month	Kwh To be Generated From Stirling	Rice Husk	Wood	Sewage	Organic waste	Chicken Manure Dry	Dairy Waste Dry	Cow Dung
		KG	KG	KG	KG	KG	KG	KG
JAN	354160.70	708321	531241	5903859	1770804	1416643	1862885	9282552
FEB	328374.51	656749	492562	5474003	1641873	1313498	1727250	8606696
MAR	350423.90	700848	525636	5841566	1752120	1401696	1843230	9184611
APR	348309.41	696619	522464	5806318	1741547	1393238	1832107	9129190
MAY	218181.48	436363	327272	3637085	1090907	872726	1147635	5718536
JUN	203918.67	407837	305878	3399324	1019593	815675	1072612	5344708
JUL	344141.87	688284	516213	5736845	1720709	1376567	1810186	9019958
AUG	348286.83	696574	522430	5805941	1741434	1393147	1831989	9128598
SEP	344939.06	689878	517409	5750134	1724695	1379756	1814379	9040853
OCT	246202.10	492404	369303	4104189	1231010	984808	1295023	6452957
NOV	265181.23	530362	397772	4420571	1325906	1060725	1394853	6950400
DEC	196265.16	392530	294398	3271740	981326	785061	1032355	5144110
Total Kg/Year		7096770	5322577	5,91,51,577	1,77,41,925	14193540	18664505	93003169

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