Guwahati city profile in terms of drainage system and GMDA's initiative in Nature based solution

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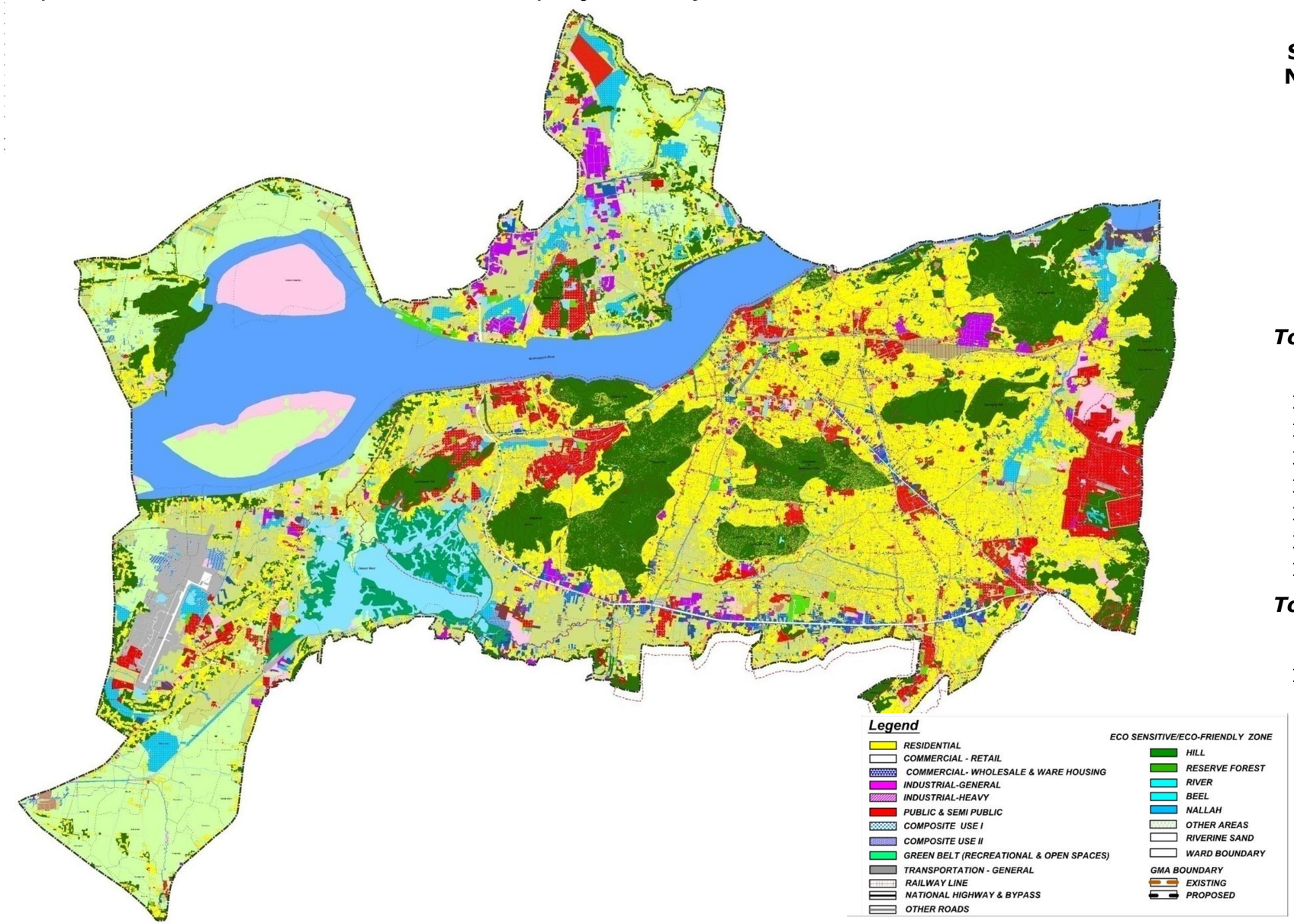
- Guwahati city profile in terms of drainage system
- GMDA's initiative in Nature based solution

Existing Land use- Guwahati Metropolitan Area (GMA) area 328 SqKm

- Population: census 2011 - 1.14 Million, projected by 2045- 3.86 Million



Existing - 2021

Sr. No.	Landuse Type	Area (Sq Km)
1	Residential	*86.40 (26.3%)*
2	Commercial	*6.40*
3	Industrial	*5.75*
4	Mixed	*2.72*
5	Public and Semi Public	*22.98*
6	Public Utilities	*0.76*
7	Recreational	*2.22*
8	Transportation	*17.64*
Total (Developed Land)		***144.87 (44.6%)***
9	Vacant	*43.70*
10	Agricultural	*42.20*
11	Forest/Tree Clad	*57.70 (17.6%)*
12	Barren Land	*7.74*
13	Eco-Friendly	*5.8*
14	Waterbody	*16.46 (5%)*
15	Wetlands	*8.00 (2.4%)*
16	Aquaculture	*1.53*
Total (Undeveloped Land)		***183.13 (55.8%)***
17	Others (Dairy farm, Brick kiln, Gaushala/Sheds, Poultry farm, Quarry)	0.9
Grand Total		**328.00**

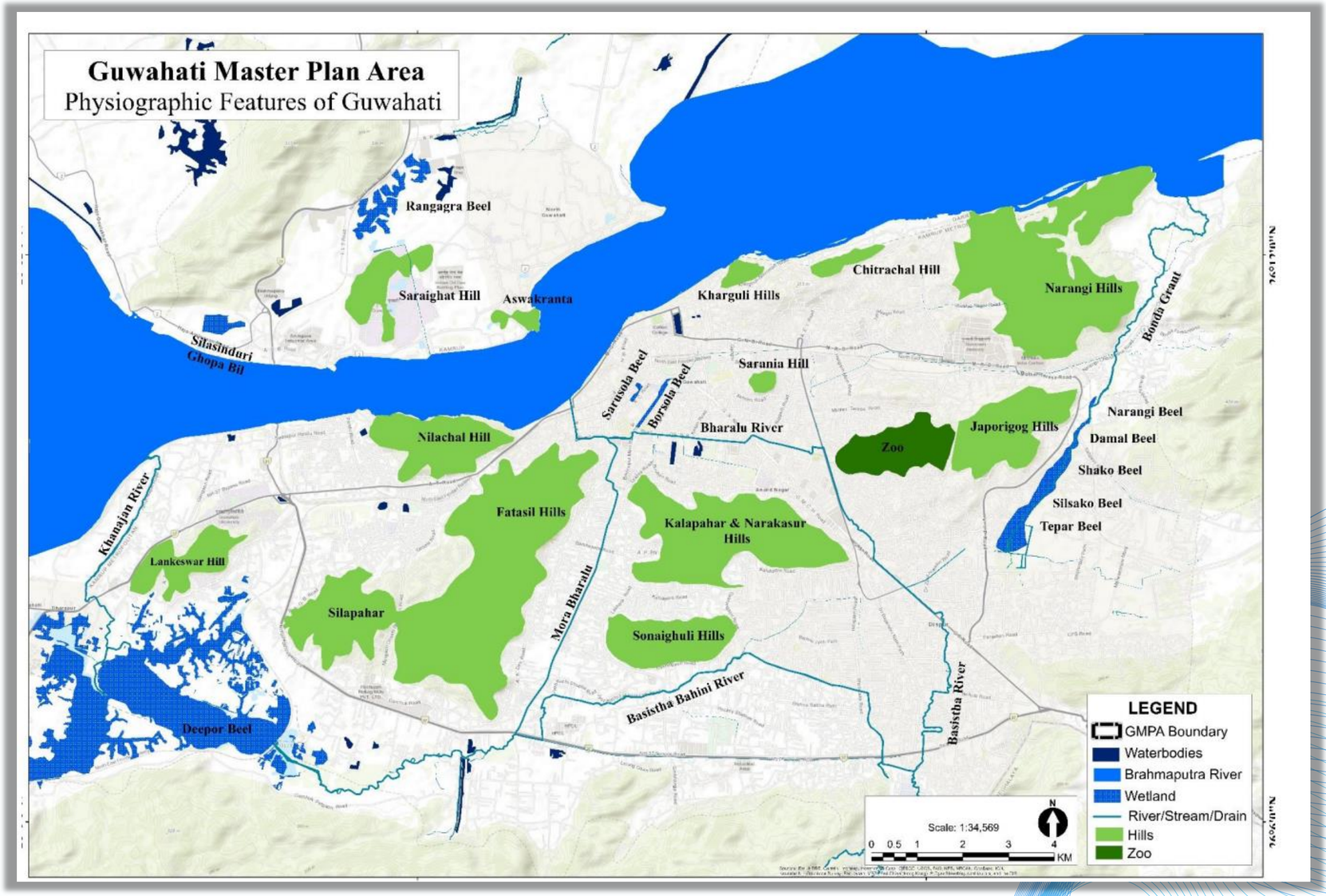
Guwahati city : Blue- Green Infrastructure

Guwahati city God gifted Blue-Green city and has a natural drainage system

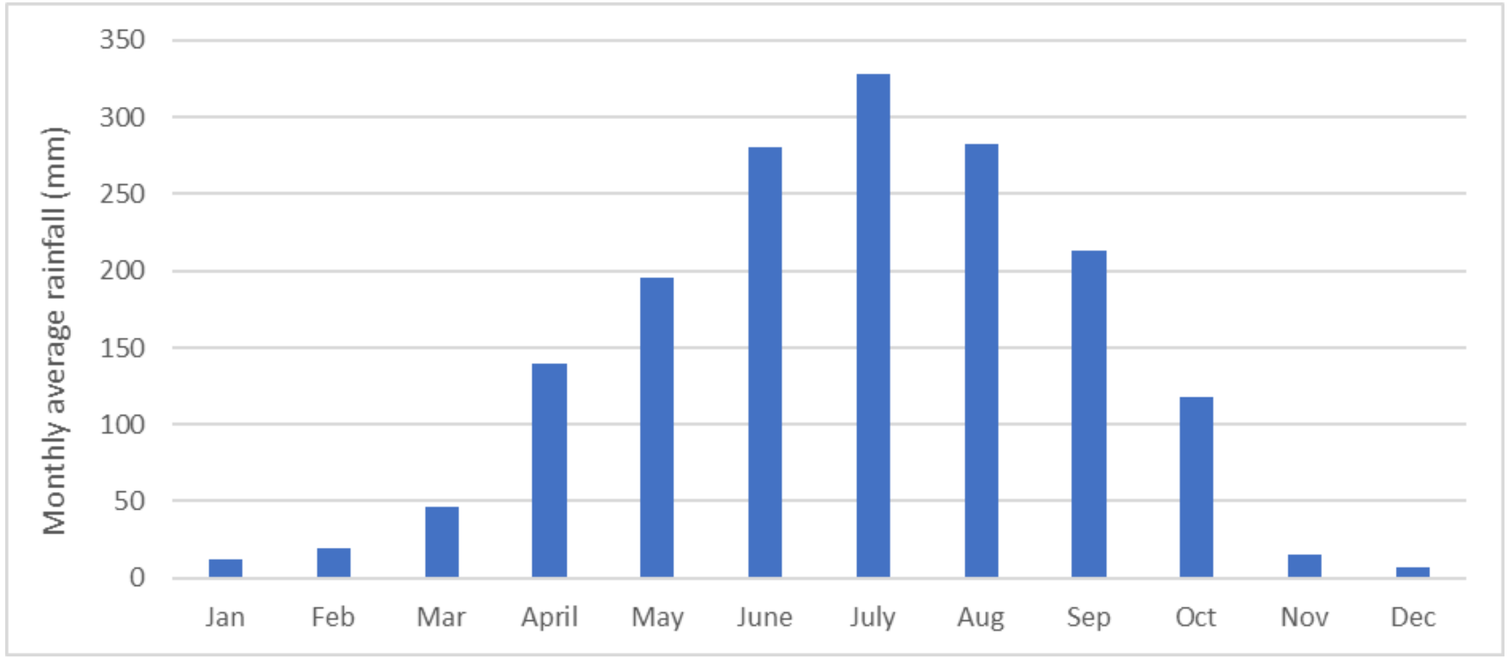
River: The Brahmaputra River runs through the city around 29 km stretch and is an outfall of the Guwahati drainage system. Bahini and Basistha river originating from Meghalaya hill flows through the city and ultimately fall to Brahmaputra. Bharalu river and Morabharalu flow through the heart of the city.

Wetland: There are four major protected wetlands in the city namely: Dipor Beel, Sarusola & Borsola Beel, Silsako Beel and Bondajan.

Hills: The southern and eastern sides of the city are surrounded by hills. The central part of the city also has small hillocks namely Sarania Hill, Nabagraha Hill,Nilachal Hill and Chunsali Hill



Rainfall



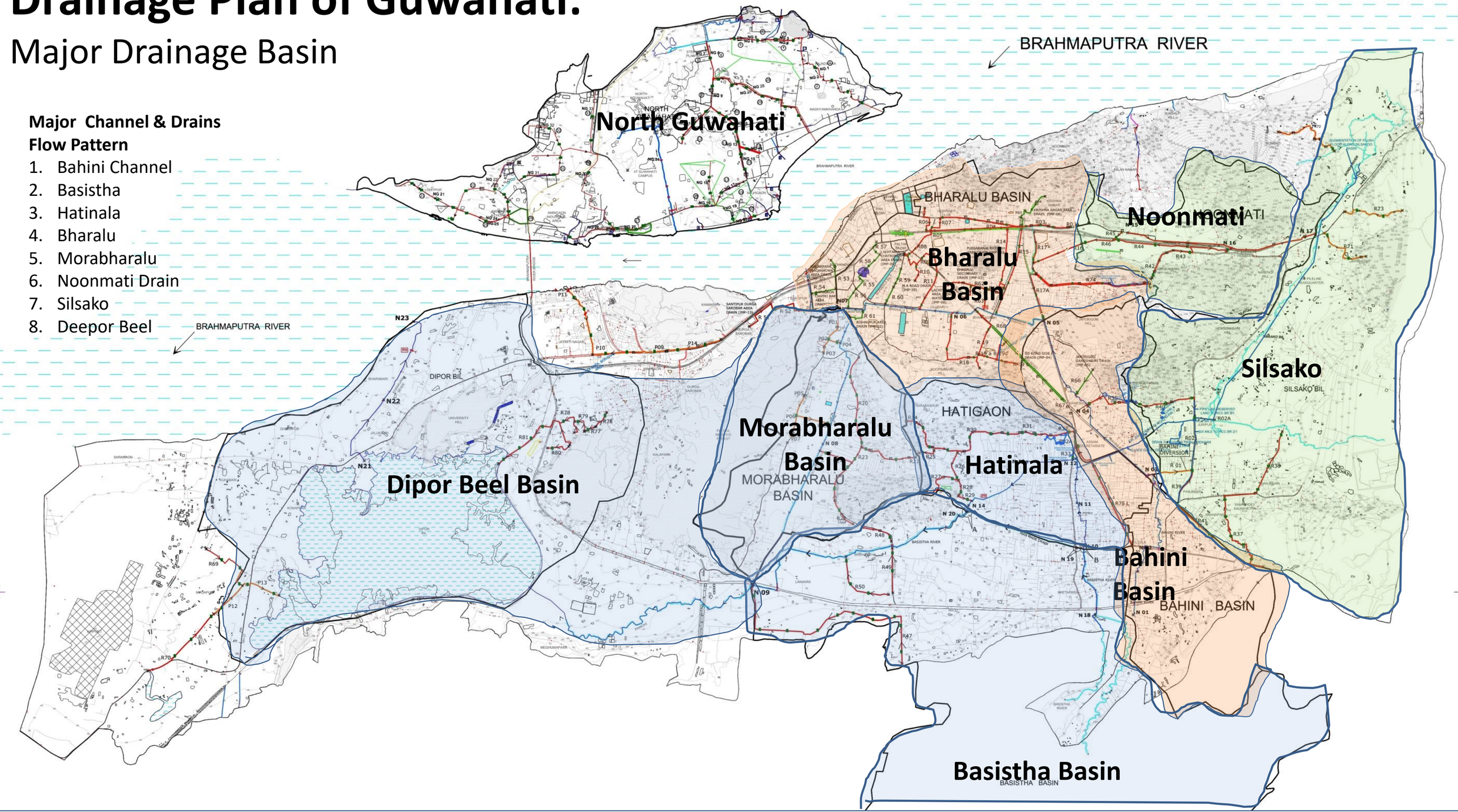
Guwahati receives an average of 1722 mm of rainfall per year.

Drainage Plan of Guwahati:

Major Drainage Basin

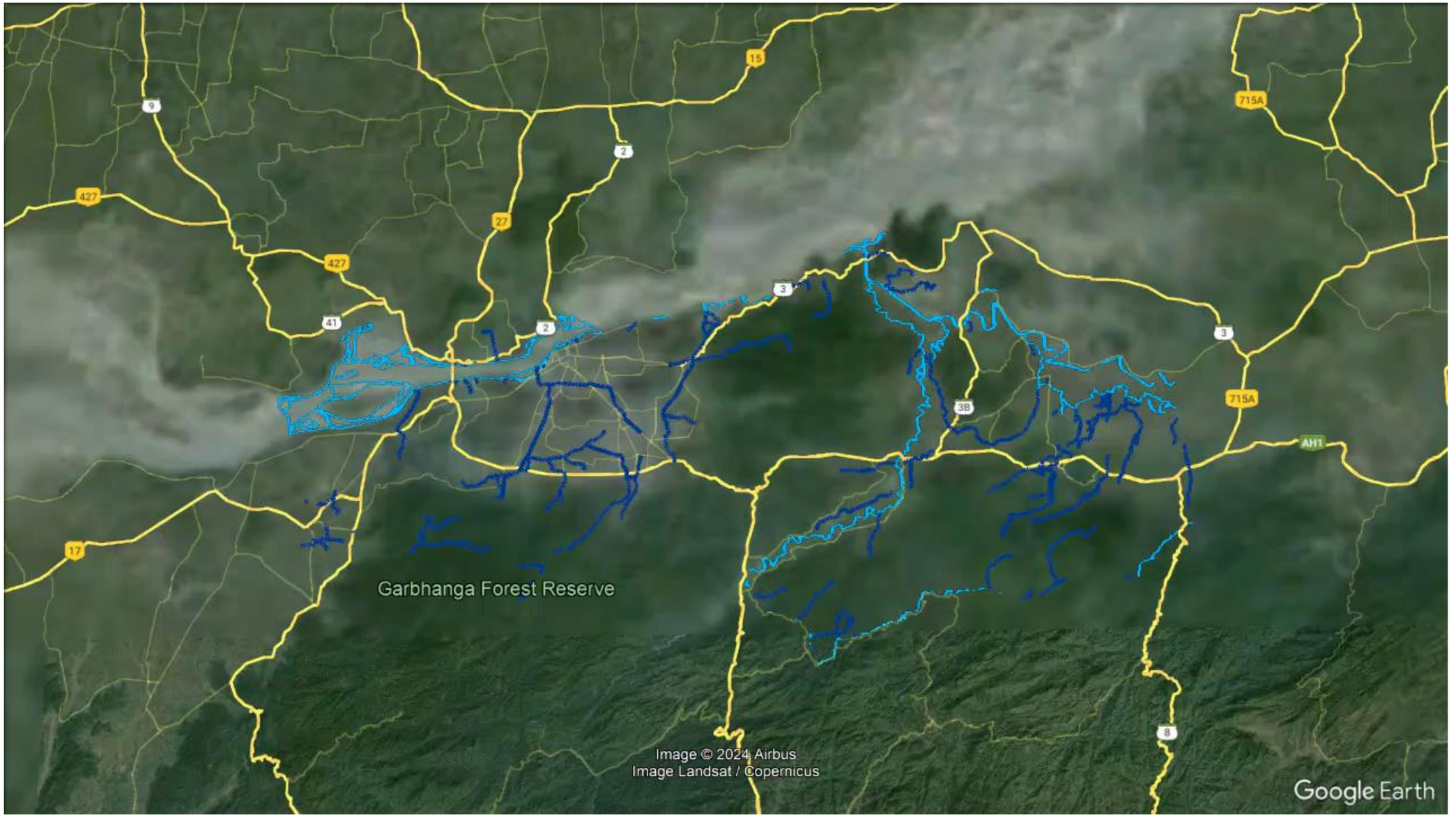
Major Channel & Drains
Flow Pattern

1. Bahini Channel
2. Basistha
3. Hatinala
4. Bharalu
5. Morabharalu
6. Noonmati Drain
7. Silsako
8. Deepor Beel



Major drainage basin and channel outfall at Brahmaputra river

SN	Basin	Major Channel	Catchment Area SqKm	Length in Km	Design Discharge in 2008
1	Bahini basin	Bahini channel	16.83	8.5	48 cumecs
2	Bharalu basin	Bharalu river	19.36	4.8	83 cumecs
3	Morabharlu basin	Morabharlu channel	12.91	6.5	27 cumecs
4	Hatinala basin	Hatinala channel	11.9	5.1	24 cumecs
5	Basistha basin	Basistha channel	83.74	8.7	274 cumecs
6	Silsako Beel		50	5	75 cumecs
7	Noonmati basin	Noonmati drain	12.5	5.2	50 cumecs
8	Dipor beel basin	Dipor beel and Pamohi channel	46.24	Pamohi channel 7 km	66.3 cumecs
All these channel flows to Brahmaputra through Bondajan, Bharalu and Khanajan point. These points have sluice gate and pump mechanism to prevent back flow of water from Brahmaputra.					


Garbhanga Forest Reserve
Image © 2024 Airbus
Image Landsat / Copernicus
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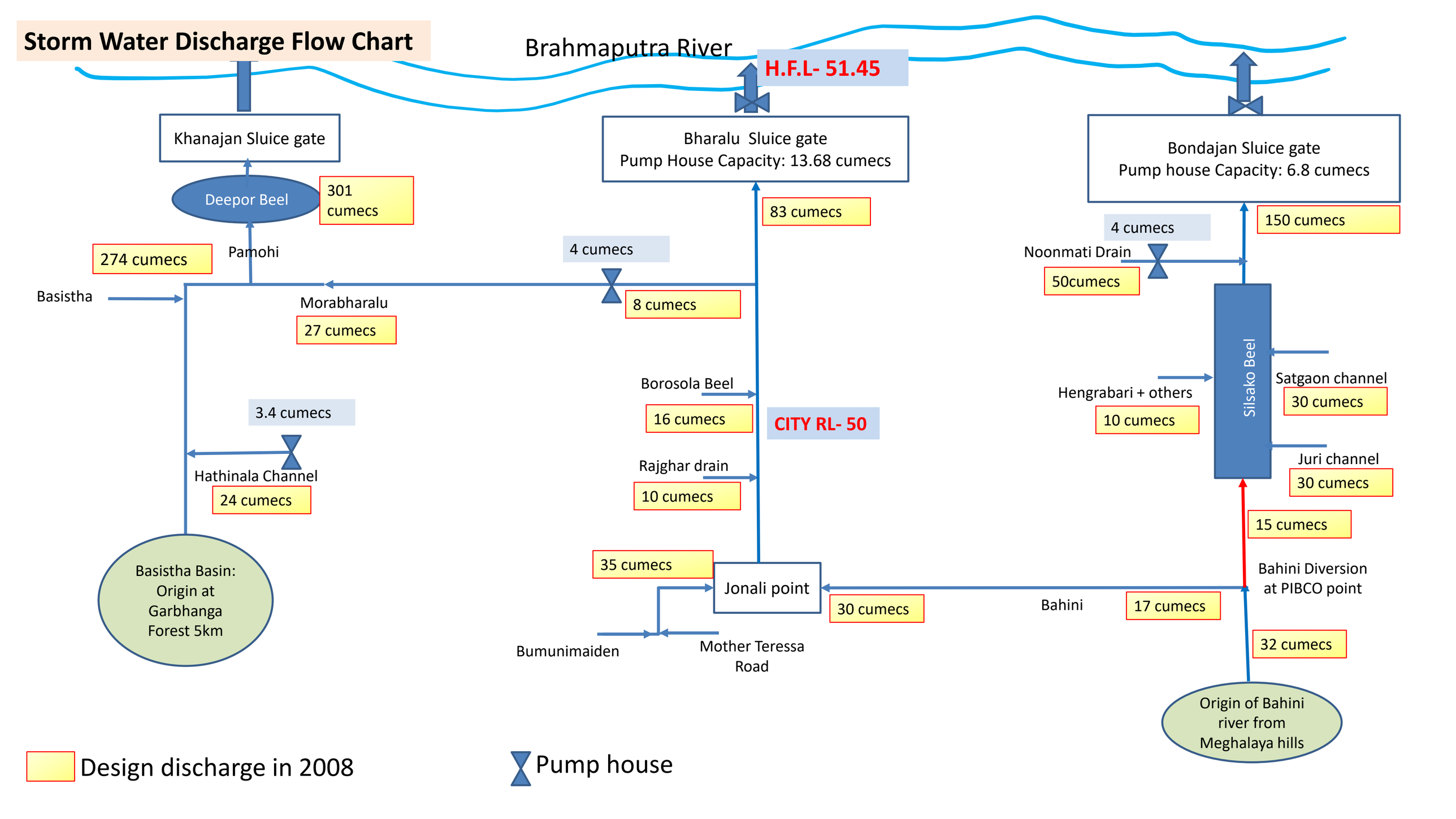
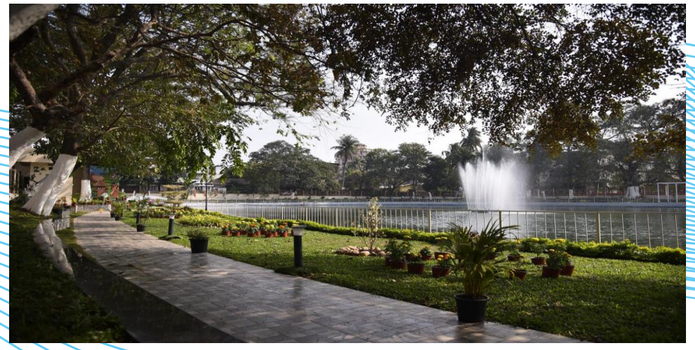
Storm Water Discharge Flow Chart



GMDA's initiative

Rejuvenation of wetlands

Construction of stormwater drains and installation of pump



creation of green areas

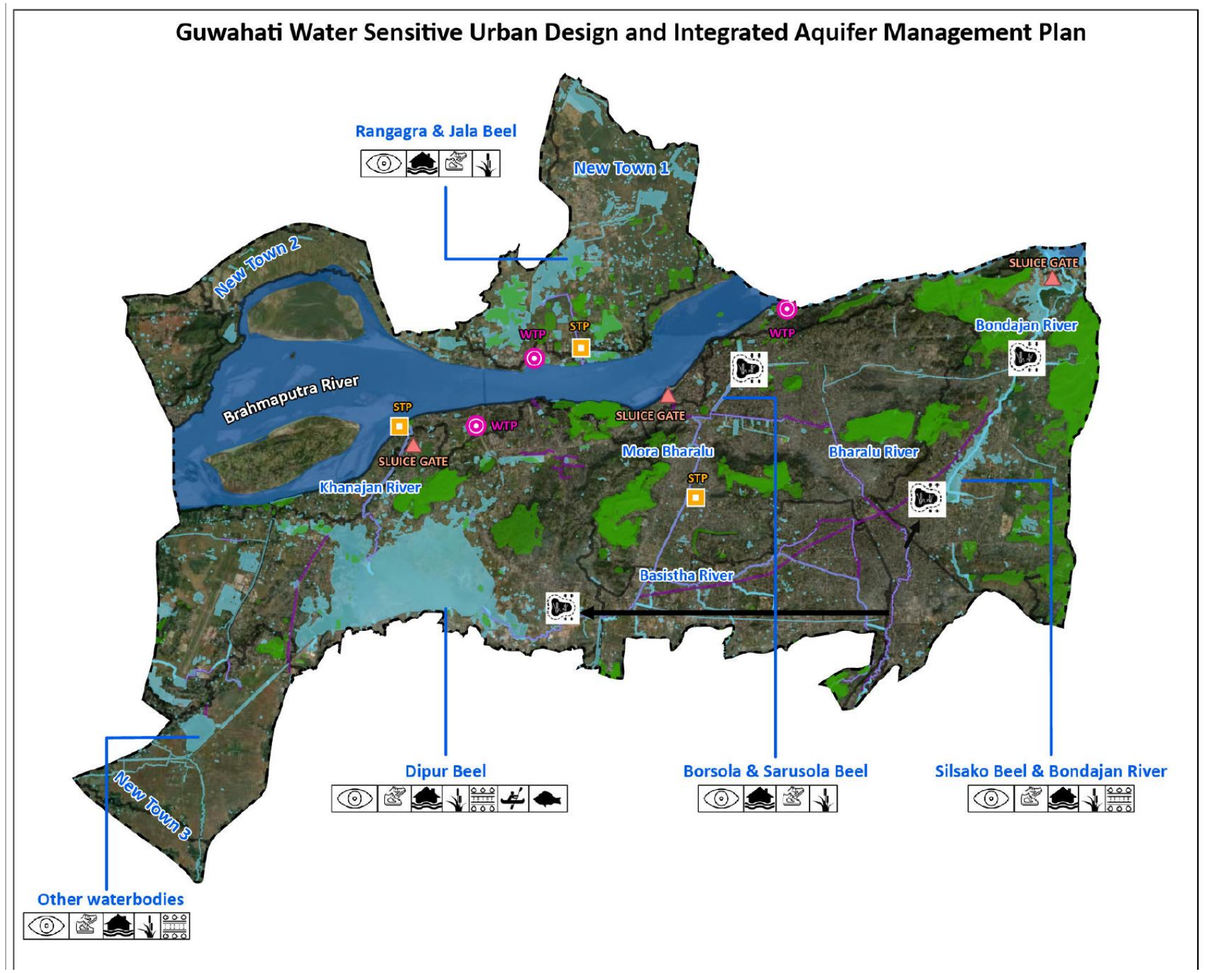
Transition towards Sponge City:

With the concept of Sponge city around the world GMDA in 2022 taken up Sponge City Master Plan.

An approach to urban land and water planning and management that places water environments and water-related matters at the centre of city planning and decision-making

Key principles:

- City as a water supply catchment
- City providing ecosystem services
- City comprising of water sensitive communities



Approach:

- An Integrated Water Resource Management Plan:
- A Waterbody Rejuvenation Plan:
- A Stormwater Management Strategy:

➢Conveyance

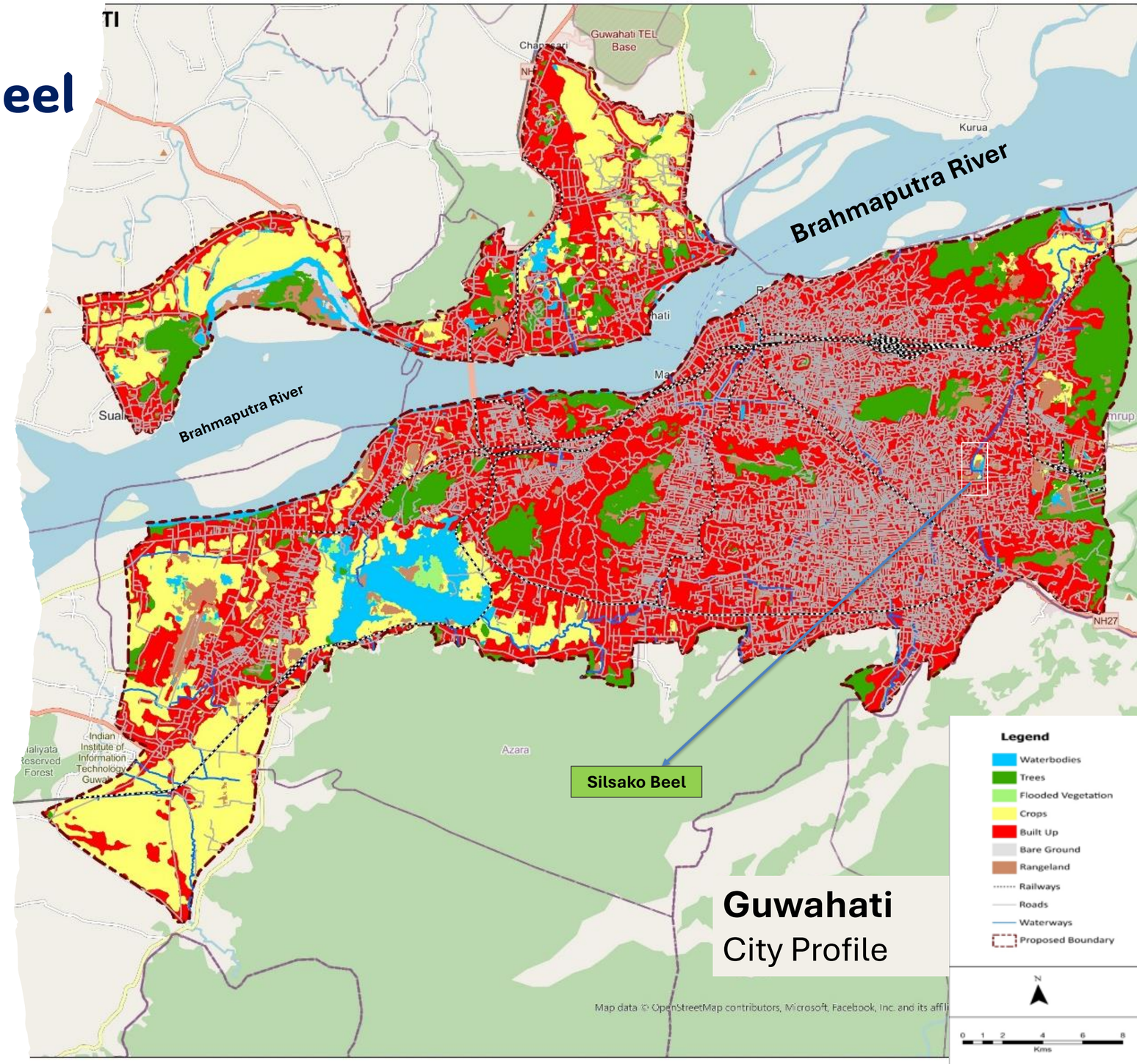
➢Storage and detention (to manage increased stormwater peak flows)

➢Retention (to manage increased stormwater volume)

➢Treatment (to manage pollutants in stormwater).

Development of Silsako Beel

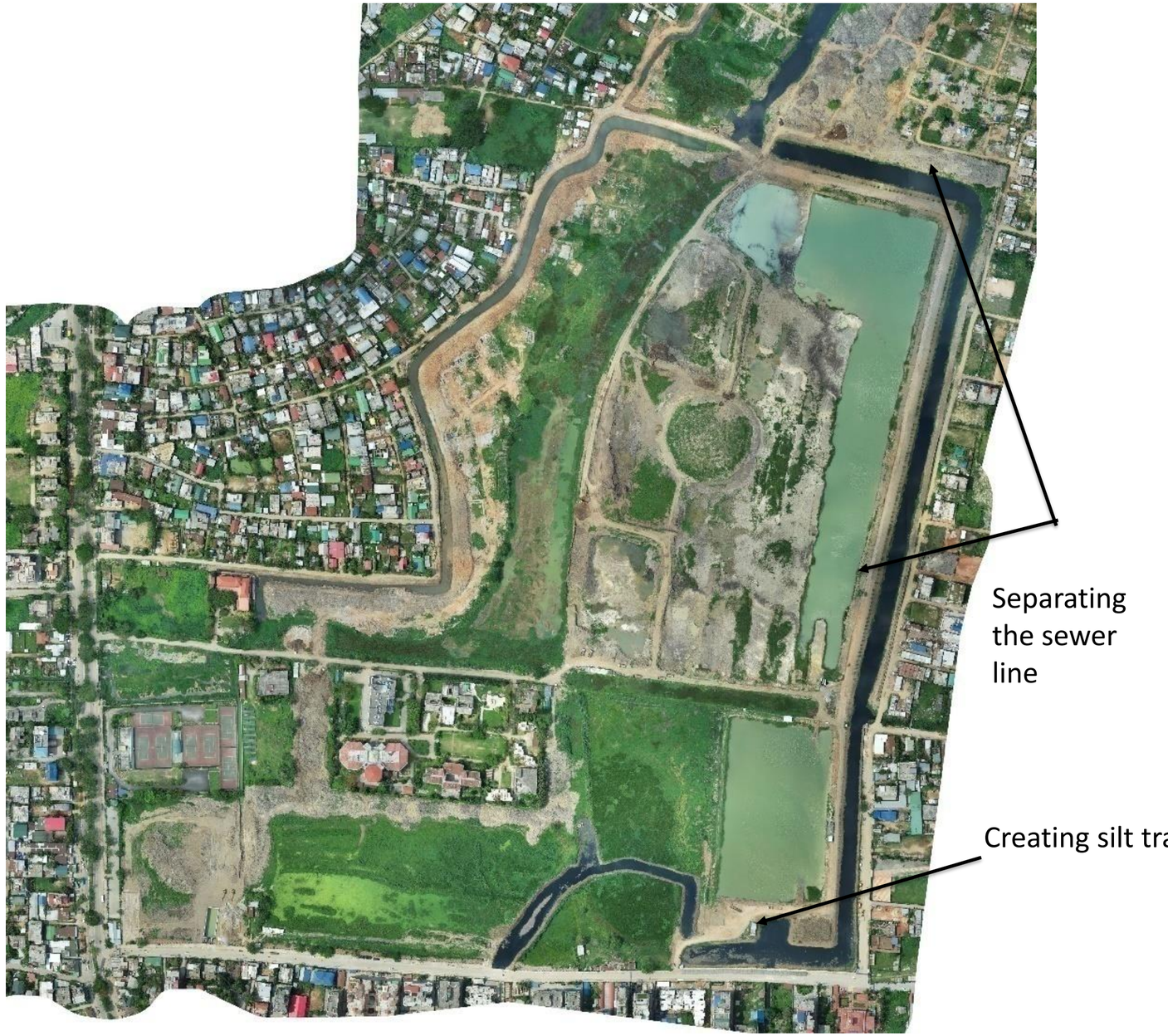
- Silsako is a natural wetland in the eastern side of the Guwahati city. It was originally spread over an area of 450 Acres.
- The beel acts as water reservoir with outfall from two of the major water rivulet viz Juri & Bahini river originating from Meghalaya hills and seven other city drains carrying storm water and sewer.
- The catchment area of the Beel 50 sq km .
- Silsako water finally flows to the Brahmaputra river. The downstream is known as Bondajan and is approx 7 km long.
- The Silsako Beel is notified as a wetland under the Guwahati Water bodies (Preservation and Conservation) Act 2008 and amended in May 2010.



Works undertaken

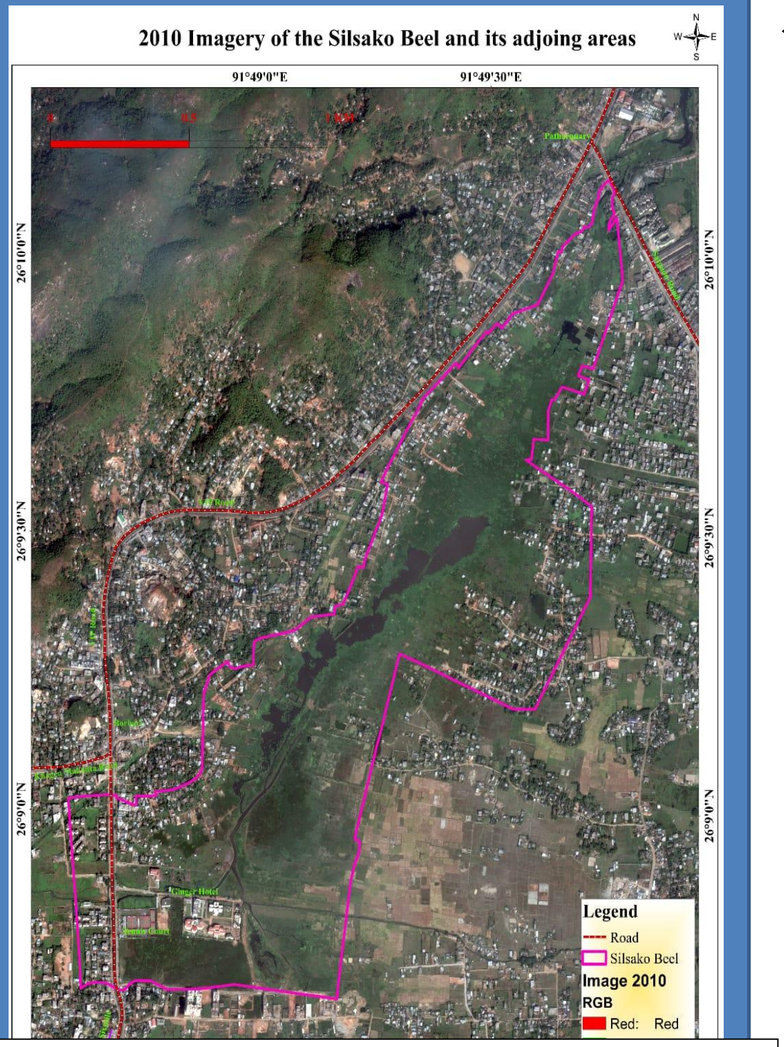
In 2021, the following Work initiated based on the State Government Action Plan submitted to NGT for improvement of water quality of Silsako Beel.

- ✓**Flood Mitigation**
- ✓**Excavation of the Beel**
- ✓**Desilting of the water body, removal of hyacinth**
- ✓**Removal of Encroachment**
- ✓**Creation of separate waste-water channel & Bioremediation**
- ✓**Conservation of the Biodiversity**
- ✓**Fencing of the beel to prevent encroachment.**
- ✓**Creation of walkways**



Beel as of 2024: Channelizing the sewer line

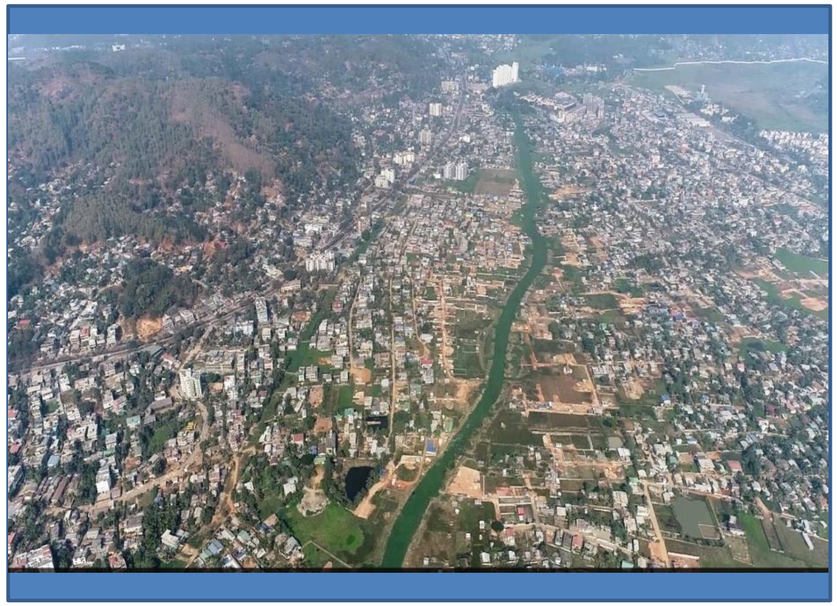
Encroachment removal :



Nov. 2010

Total Notified area= 450 acres (1361 bigha)

- ✓ The total Beel area recovered from encroachment about 166 acres. **The present area of under possession of GMDA is 270.00 acres.**



Encroachment pattern August 2021

Dec, 2023

Excavation of Lake and Channel Area :

- ✓ Excavation work started in December 2021 to increase retention capacity. As on May, 2024 1.5 million cubic retention capacity is achieved.
- ✓ Before Excavation, water retention capacity was less than 0.5 million cubic meters.
- ✓ ***The target for water retention capacity of the Beel including the channels is 3.5 Million cubic metres***

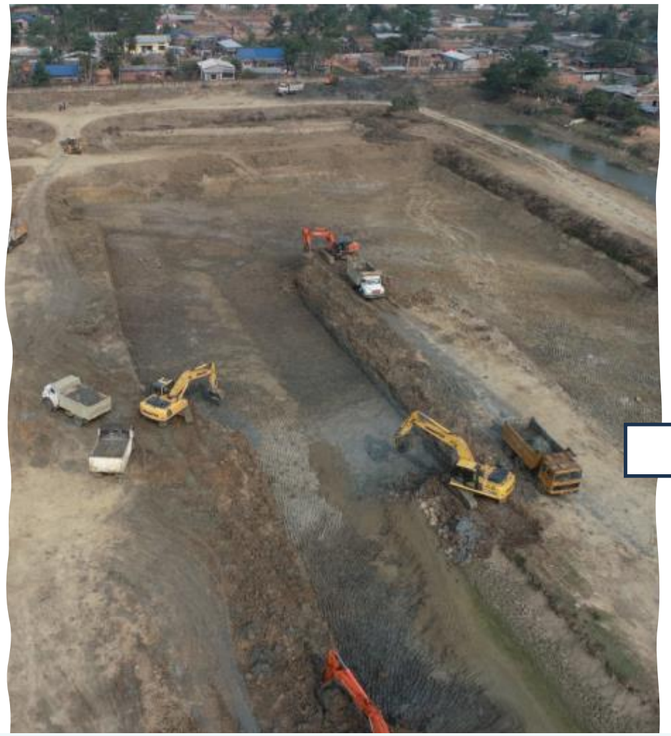


Photo: Lake Excavation in Jan 2022

Nature based solution to improve water quality at Silsako Beel

- Bioremediation work started on pilot basis at Silsako Beel.
- ➢ Construction of 8-15 M wide x 6000 M and peripheral channel around the beel to prevent dirty water to the beel.
- ➢ Regular cleaning and desilting and removal of water hyacinth is done.
- ➢ Dosing of non-toxic biological and non- hazardous Biological product **PERSNICKETY®713** developed by Syneco Systems, Inc. The work also includes the coir logs, geotextile bags, screen bars, aeration system, Floating island, Creation of riparian zone.
- Constant monitoring device & regular testing.
- Tree plantation planned for about 7000 native trees & shurbs. Around 1000 trees planted till date
- Parameters achieved

SN	Water Quality Parameters	Parameters before Treatment	Parameters As per CPCB Norms	Parameters Achieved on date Feb, 2024
1	BOD	70-90mg/l	≤10mg/l	9 mg/l
2	COD	310-360mg/l	≤50mg/l	48 mg/l
3	Total Suspended Solids (TSS)mg/l	200-230mg/l	≤20mg/l	16mg/l
4	pH	5-6	6.5 to 9.0	7.57

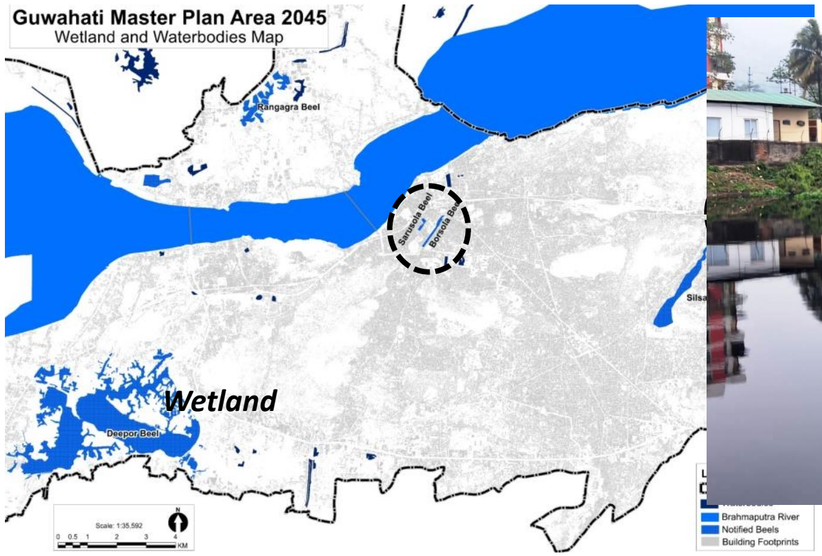
Dosing of non-toxic biological


Plantation

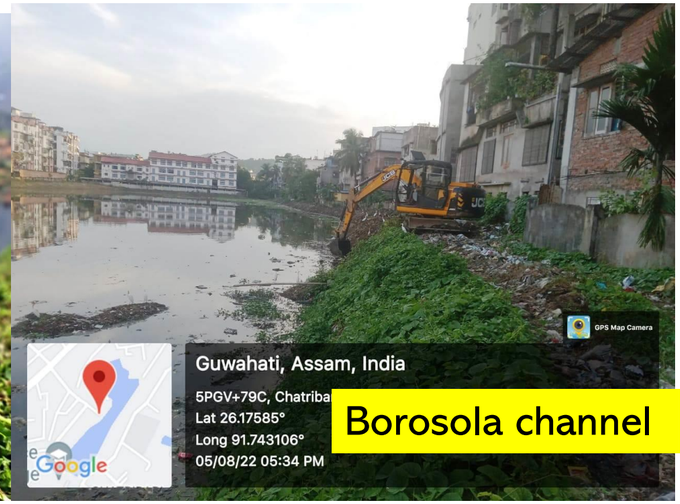

Cleaning- Desilting with Water master


Migratory birds at Silsako

Development of other Wetland



Bondajan channel



Borosola channel

Creation of recharge at Bondajan channel

Sarusola channel

Pamohi channel

Water bodies inside Gauhati University Campus at Jalukbari

Cleaning of Water bodies inside the Gauhati University Campus at Jalukbari

CONSTRUCTION OF A PUMP HOUSE & INSTALLATION OF PUMP AT BONDAJAN

- Project cost: Rs.1120.00 Lakh
- Project Details: Construction of pump house & installation of 2 (two) nos high discharge M.F. water pump 17000 LPS near Bonda sluice gate for dewatering of storm water from Bonda channel towards Brahmaputra River.
- Inaugurated on 28th Sept.2023

Construction of Pump House at Silsako Beel & Enhancing Discharge Capacity of Bahini Diversion from PIBCO to Silsako Beel

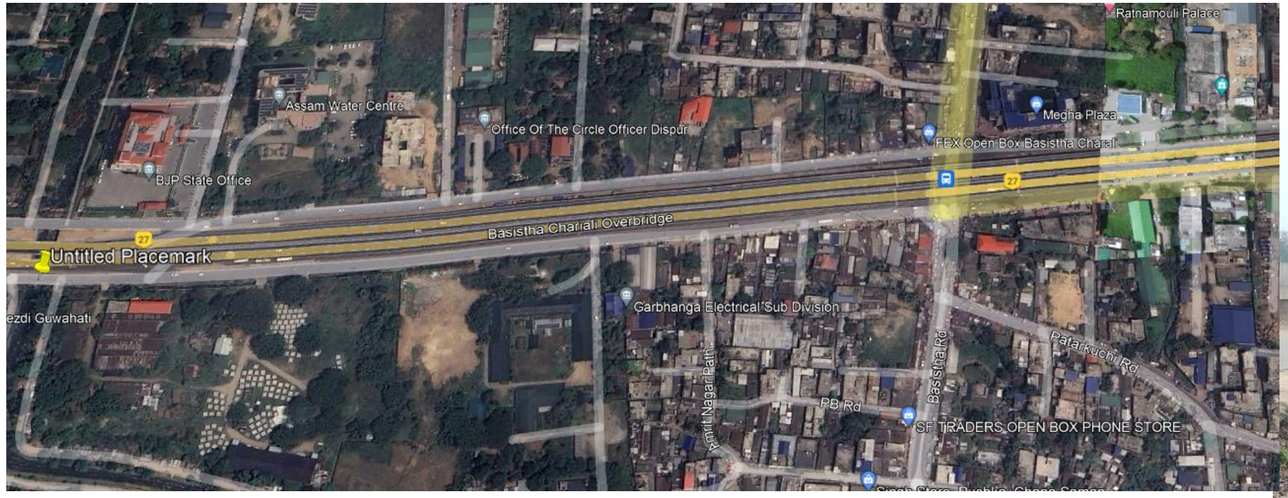
- Project Cost: Rs 1482.14 Lacs
- Project Details: to increase the flow of the Bahini diversion drain from PIBCO point to Silsako point. Design for two automated Pump of total capacity of 3.4 MLS with sump pit of capacity 2700 cum (size 30m x 12m x 7.5m depth) .

Construction of drainage channel from Narengi Railway Station to Bondajan confluence

- Project Cost: Rs 1291.04 Lacs
- Project Details: Construction of flood wall from Narengi railway station to Bondajan confluence of length 800 m x 8-10 m wide x 4-4.5 m height

Construction of Storm Water Diversion Drain from Basistha Chariali to Basistha River.

- Project Cost: Rs 613.69 Lacs
- Project Details: Construction of diversion drain from Basistha Chariali to Basistha river of 800 m length & RCC drain size 3 m to 3.5 m



Green Open Park in last 3 years

Creating a green open space in the city

Botanical Garden at Fancy Bazar

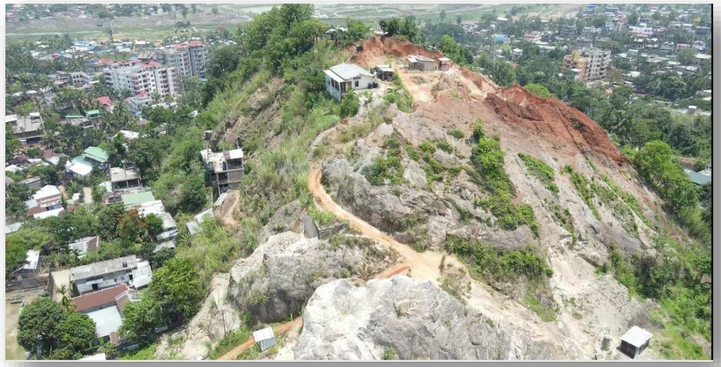
JurPhukuri

Nehru Park

Creation of Pilot Urban Forest at Borbari Hillock, Guwahati

Project cost	:	Rs. 325.88 Lakhs

Features Area: 4 sqkm	:	i. Slope stabilization for prevention of soil erosion on hillock. ii. Plantation of 1400 (approx.) indigenous tree saplings



Brahmaputra Riverfront as open green space

THANK YOU