

RIVER - SENSITIVE SECTORAL STRATEGIES IN THE MASTER PLAN

A compendium of provisions made in the Master Plans of river cities





About the Publication

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River-Sensitive Sectoral Strategies in the Master Plan - A compendium of provisions made in the Master Plans of river cities

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Introduction

Healthy rivers are an absolute necessity for productive and liveable cities. Therefore, cities need to plan their development activities with due consideration for the river; respecting the threshold of disturbance that it can handle naturally. This will not only help in the long-term conservation and preservation of the river; it will also help leverage the economic, social and environmental value of the river in a sustainable manner.

This can be done by integrating river thinking into the Master Plans for cities. A master plan is a dynamic long-term planning document that provides a conceptual layout to guide future growth and development.

These documents can directly capture river-specific considerations by preparing appropriate strategies, allocating eco-sensitive land uses, prescribing specific norms or recommending suitable actions for the river zone.

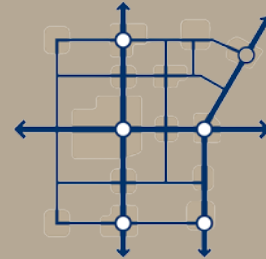
However, a Master plan can also propose strategies that have an indirect connection with urban river management. Master plans may rely on suitable strategies for shelter, mobility, infrastructure, heritage or economy for this purpose.

This document is a compilation of some such **sectoral provisions made in the Master Plans of river cities across the globe.**

Sectoral Implications of a Master Plan



Shelter



Mobility



Infrastructure



Heritage

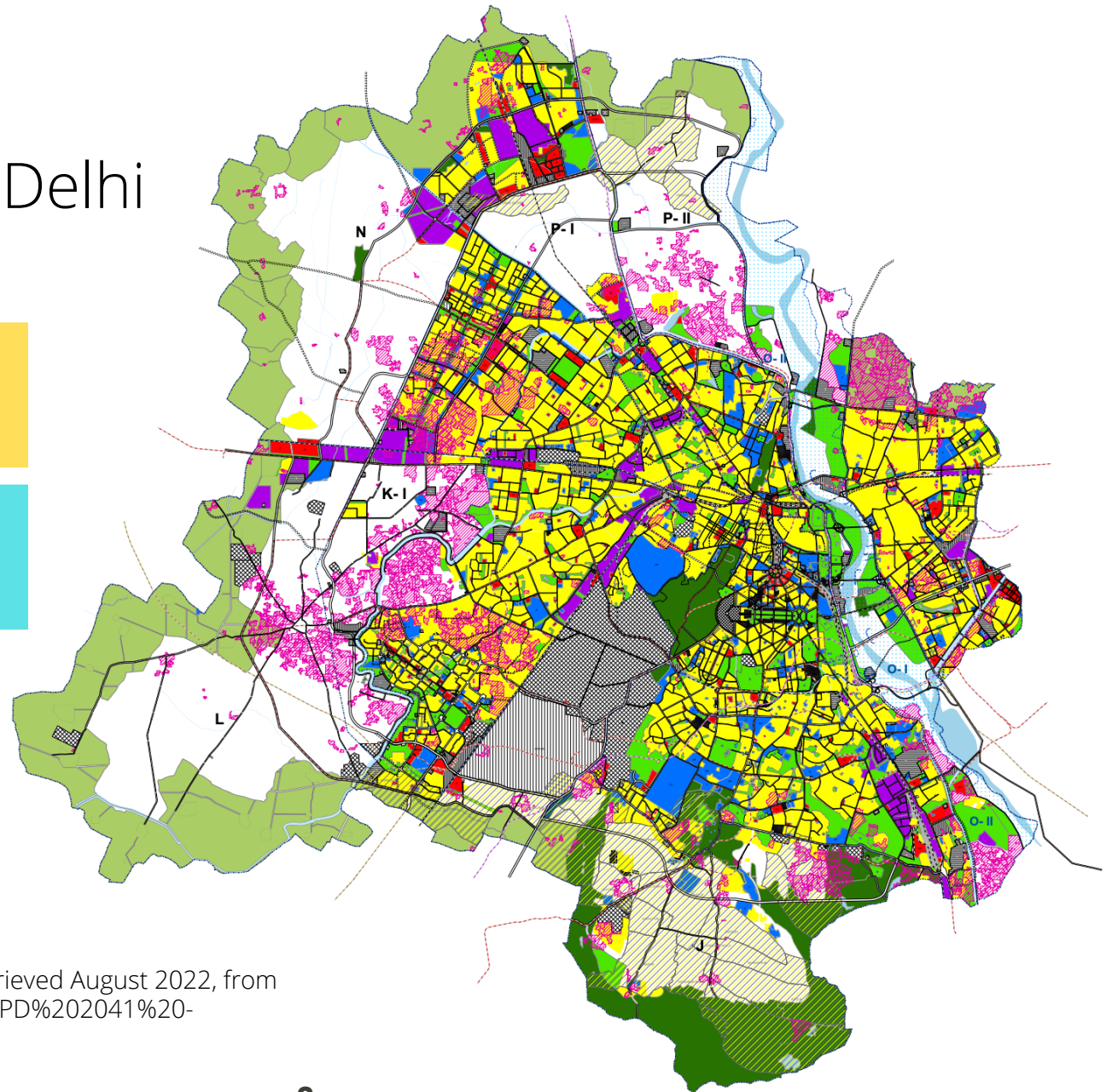
Draft Master Plan for Delhi 2041



SHELTER



INFRASTRUCTURE



Reference Source:
Delhi Development Authority. (n.d.). Retrieved August 2022, from
https://dda.org.in/pdf/july13/Final%20MPD%202041%20-%20e%20Gazette_%20English.pdf



SHELTER

Green Blue Factor (GBF)

The Draft MPD 2041 introduced a 'Green Blue Factor' to promote the development of green-blue features within plots/buildings in the form of roof gardens, terrace gardens, green walls, landscaped and/or pervious ground, etc. shall be encouraged in all development projects.

Some of the important features of this instrument are highlighted below.

- It is applicable to all new projects and developments
- Incentives and disincentives may be provided by local bodies for achieving a minimum GBF
- All new projects and developments shall have to achieve a minimum GBF value
- Computation of GBF shall be done at plot level and shall be integrated for all building/ layout sanctions
- It is computed by combining the prescribed weightage of specific green and blue features provided in the site and building design

+

S. No.	Type of Blue/green element (X)	Factor
1	Impervious surface (including paved areas, black top driveways and internal streets, roof surface without green roof)	0
2	Chlorinated water feature (e.g. swimming pool)	0.2
3	Green Wall (supported vertical systems for plants on external wall surfaces)	0.2
4	Pervious surface with water absorbent tiles	0.3
5	Pervious surface with manicured lawn and/or Greenhouse	0.5
6	Green Roof (minimum 70% area covered with plantation and shrubs)	0.6
7	Pervious surface with natural grass/ground and vegetation (including urban agriculture)	0.8
8	Area under tree cover (canopy density 10-40%)	0.9
9	Area under dense tree cover (canopy density 40% or more)	1
10	Open water body with non-lined bottom (non-chlorinated)	1

GBF for a plot shall be calculated using the following formula:
GBF = {(Area under element X corresponding factor) +... (Area under element nX corresponding factor)}/ Total plot area

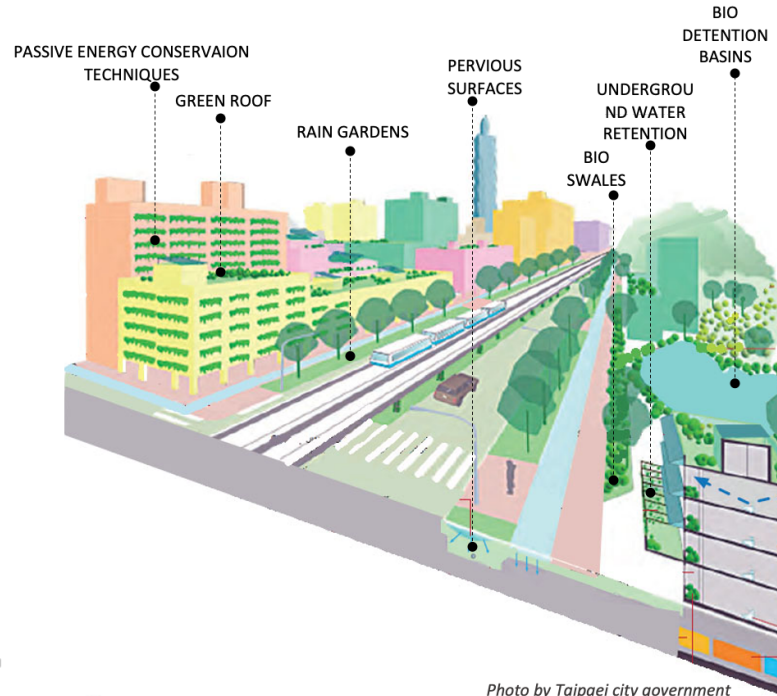


Photo by Taipei city government



Integrated Urban Water Management (IUWM)

The Draft MPD 2041 advocates an 'Integrated Urban Water Management' approach and provides inter-connected strategies for achieving long-term water security.

Reducing freshwater demand

- Water supply rationalisation to address water scarcity - Controlled water supply in new developments
- Treated wastewater for non-potable uses - 100% treatment and maximum reuse of wastewater shall be encouraged in existing and mandatory in new developments
- Low water-consuming plumbing fixtures - Installing fixtures as prescribed by the UBBL to conserve water shall be mandatory for all new developments/ regeneration projects, and all existing government, commercial and PSP buildings/ plots
- Encourage citizens towards water-sensitive behaviour

Optimising bulk reuse of wastewater

- Treatment of all wastewater by augmentation of treatment capacity, maximum collection of waste water through better coverage of unsewered areas, installation of interceptor sewers
- Phasing plan for incrementally increasing the wastewater reuse incorporating the following bulk uses - discharge in the river, water body rejuvenation, ground water recharge, and direct uses like horticulture/ irrigation/ carriage and vehicle cleaning/ road cleaning/ firefighting/ construction

Maximising stormwater retention

- Large parks and open spaces shall be located in low lying areas, in all new developments
- Improvement of pervious surfaces throughout the city by adopting WSUD principles for all new layout plans and area improvement projects
- Storm water networks in new areas shall ensure that at least a proportion of the stormwater is discharged into recharge sites
- Strict regulation for ground water extraction

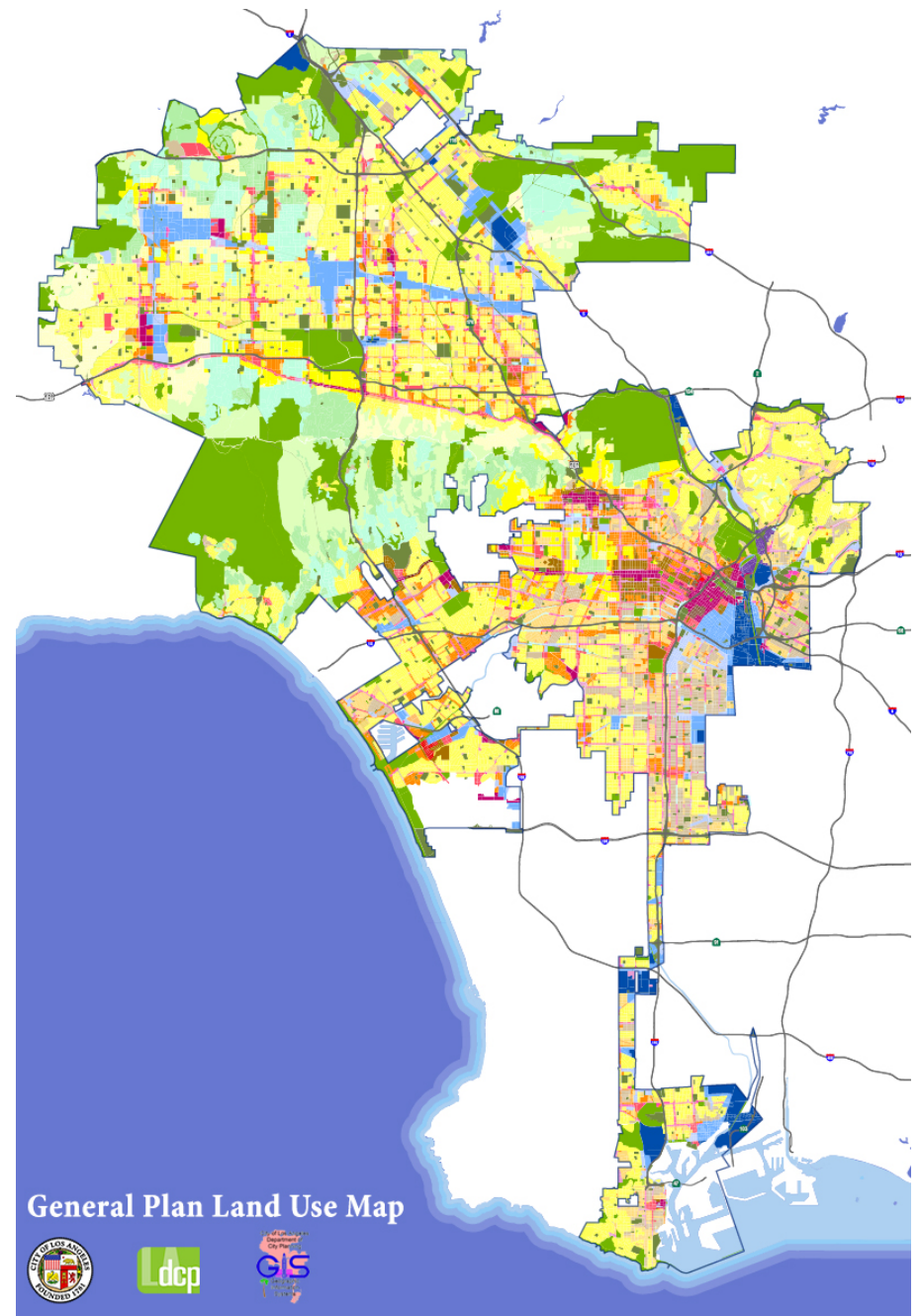
Improving water system efficiency

- Reducing NRW, adopting 24X7 water supply and smart metering
- Providing metered water connections in unplanned / unauthorised colonies
- Implementing telescopic pricing to disincentivize irresponsible use
- Periodic cleaning of the septic tanks and faecal sludge management

General Plan, Los Angeles Element Mobility, 2035



Reference Source:
General Plan Overview | Los Angeles City Planning. (n.d.).
Retrieved August 2022, from <https://planning.lacity.org/plans-policies/general-plan-overview>





MOBILITY

Green Streets

The Mobility Plan 2035, an element of the General Plan, Los Angeles, introduced the concept of 'Green Streets' to maximize opportunities to capture and infiltrate stormwater within the City's public right-of-ways.

The City's Green Streets Initiative is intended for:

- Reducing pollutant levels in stormwater through natural filtration, to improve local water quality and meet regulatory requirements
- Recharging groundwater basins, and thereby decreasing dependence of local water supply on imported water
- Improving air quality and reducing the heat island effect
- Enhancing aesthetics, which can increase pedestrian use of sidewalks and encourage the use of bicycles
- Reducing stormwater runoff to restore the natural stormwater runoff hydrograph of the land mobility pathways that occupy
- Reducing flooding

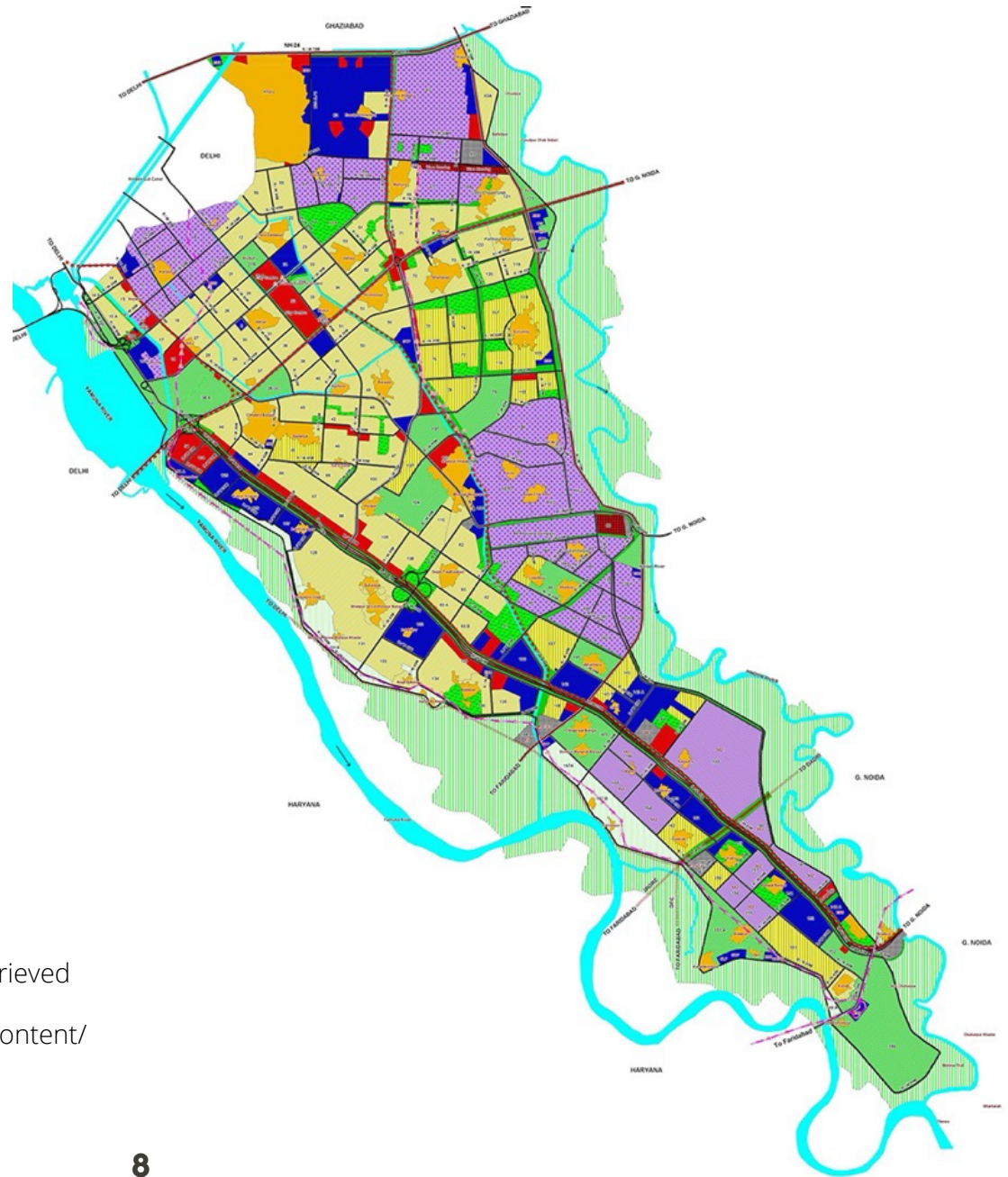
The practice includes adding canopy trees, planters, bioswales, pervious paving, infiltration trenches, curb extensions while designing mobility pathways, while focusing on areas between the roadway and sidewalk, where stormwater can be easily directed from streets and sidewalks.



Noida Master Plan, 2031



INFRASTRUCTURE



Reference Source:
Master plan 2031 R - noidaauthorityonline.in. (n.d.). Retrieved
August 2022, from
[https://noidaauthorityonline.in/site/writereaddata/siteContent/
201902081033447759MASTERPLAN2031-Detail.pdf](https://noidaauthorityonline.in/site/writereaddata/siteContent/201902081033447759MASTERPLAN2031-Detail.pdf)



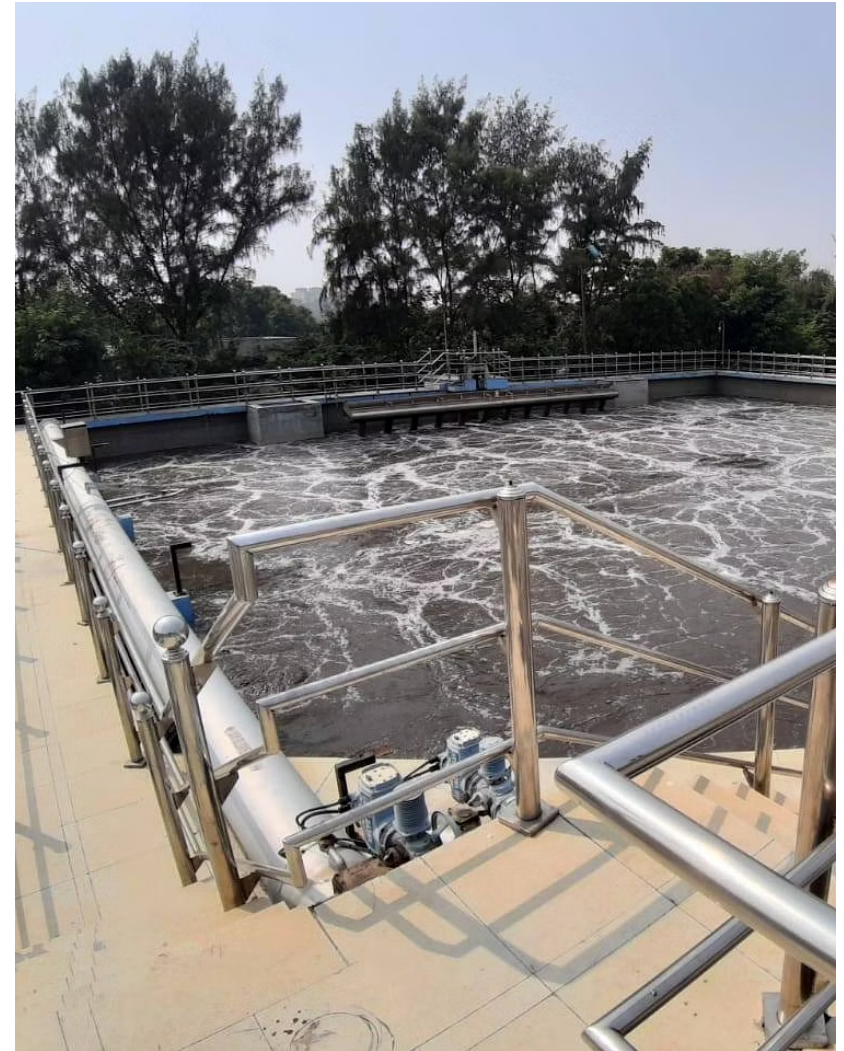
Zero Discharge License

The Noida Master Plan 2031 has proposed a strategy for 'Zero Discharge' city, by ensuring the following:

- Use treated sewage for irrigating agricultural fields and watering green areas
- Stormwater being relatively clean water must be conserved in groundwater aquifers, by enforcing rainwater harvesting in residential/industrial plots of more than 300 sq m (mandatory), parks/green areas, and all other government /authority premises
- Strengthening of bunds to prevent flooding
- 'Zero-D license' should be enforced for industrialists by law, making it necessary for them to install waste water recycling plants which will make the industry Zero-D. This shall include -

Treated water from ETPs may be recycled and can be supplied to industries for use

Reclaimed water can also be recharged artificially into the aquifer and recovered as groundwater for later use. By recharging reclaimed water in to the aquifer, 'long term storage credits' are created. Later, these credits can be recovered to withdraw water for use from permitted recovery wells



The City of Calgary, Municipal Development Plan

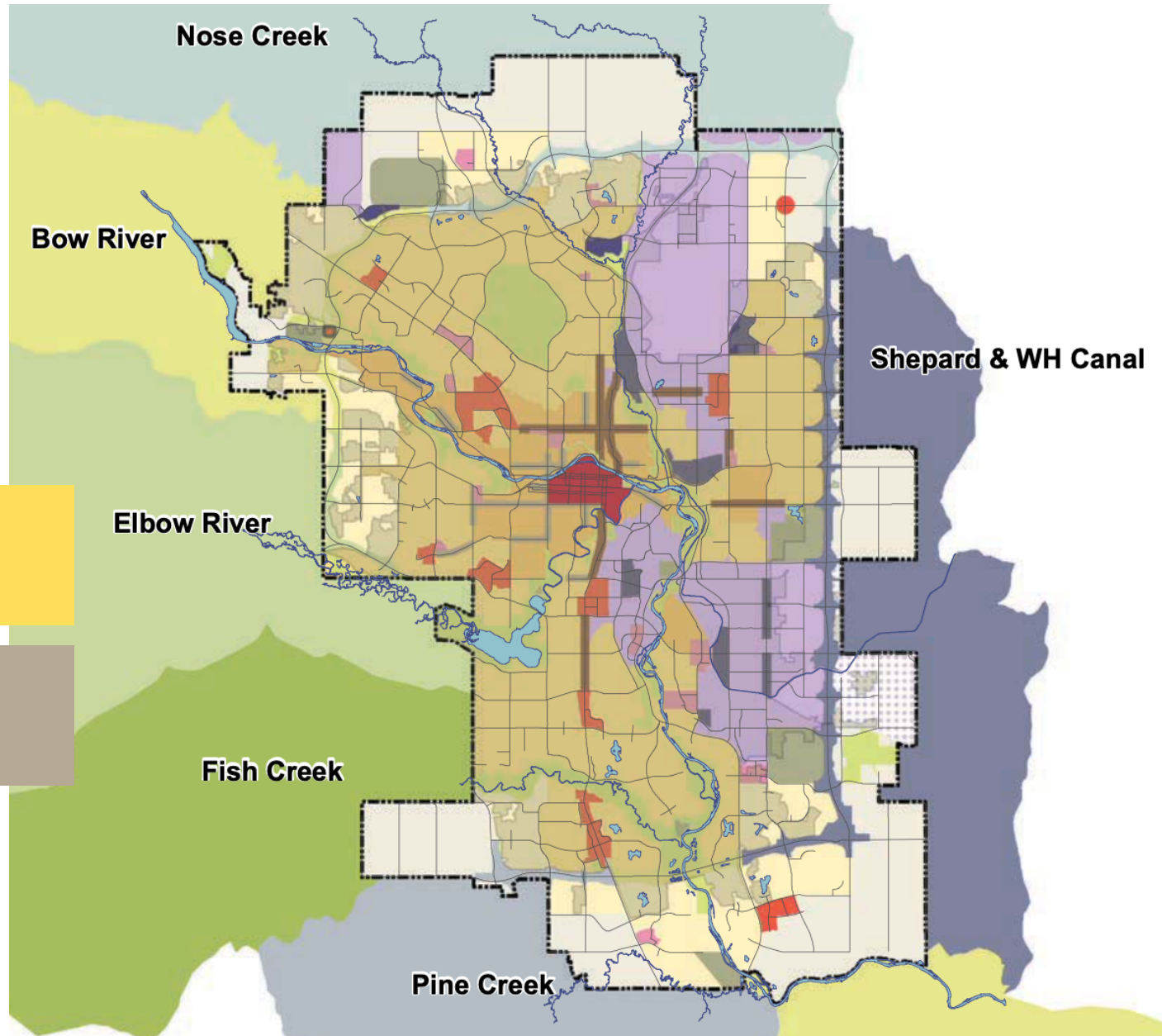


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MOBILITY

Reference Source:
Municipal Development Plan
(2020) | The City of Calgary, Feb
2021 Retrieved August 2022, from
<https://www.calgary.ca/planning/municipal-development-plan.html>





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The Municipal Development Plan of Calgary advocates to connect 'Green Infrastructure' into the urban fabric, by proposing an interconnected network of natural green and engineered green elements that provide ecological services in the urban environment.

<p>Natural green elements include trees, wetlands, riparian buffers and natural open spaces</p>	<p>Engineered green elements include infrastructure (such as green buildings, green roadways, eco-industrial parks) designed to mimic ecological functions or to reduce impacts on ecological systems</p>
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The plan proposes the following:

- Land use planning and development, urban design and transportation planning processes should incorporate the principles of green infrastructure
- Identify and protect strategic parcels, blocks, and corridors that increase ecosystem connectivity, provide opportunities for source control of stormwater infiltration, promote food production and composting, and encourage play and learning.
- Facilitate the development of eco-industrial/business parks.
- Integrate green infrastructure horizontally (e.g., parks, roads) and vertically (e.g., buildings) to maximize the provision of ecological services.

Green Infrastructure





MOBILITY

Ecological Networks

The Municipal Development Plan of Calgary proposed connected ecological networks throughout the city to maintain biological and landscape diversity. The components of this network include the river valley system, natural environment parks, regional and neighbourhood parks, pathways, linear parks, school sites, community gardens and urban plazas. The overall pattern determines the flow and movement of species in and through the landscape.



Some important strategies include:

Ecological protection

- Give highest priority to the protection of environmentally-significant areas
- Protect biodiversity within river valleys, ravines, coulees and wetlands.
- Ensure protection of significant habitats
- Protect unique environmental features

Connecting nature

- Create an interconnected open space system within and between watersheds
- Align land uses and landscape elements to increase functional connectivity
- Plan and support natural areas and parks to help shape the urban form and buffer incompatible uses

Plan Melbourne, 2017-2050



Reference Source:
Plan Melbourne 2017 - 2050 | State Government of Victoria (n.d.) Retrieved August 2022, from <https://www.planning.vic.gov.au/policy-and-strategy/planning-for-melbourne/plan-melbourne>



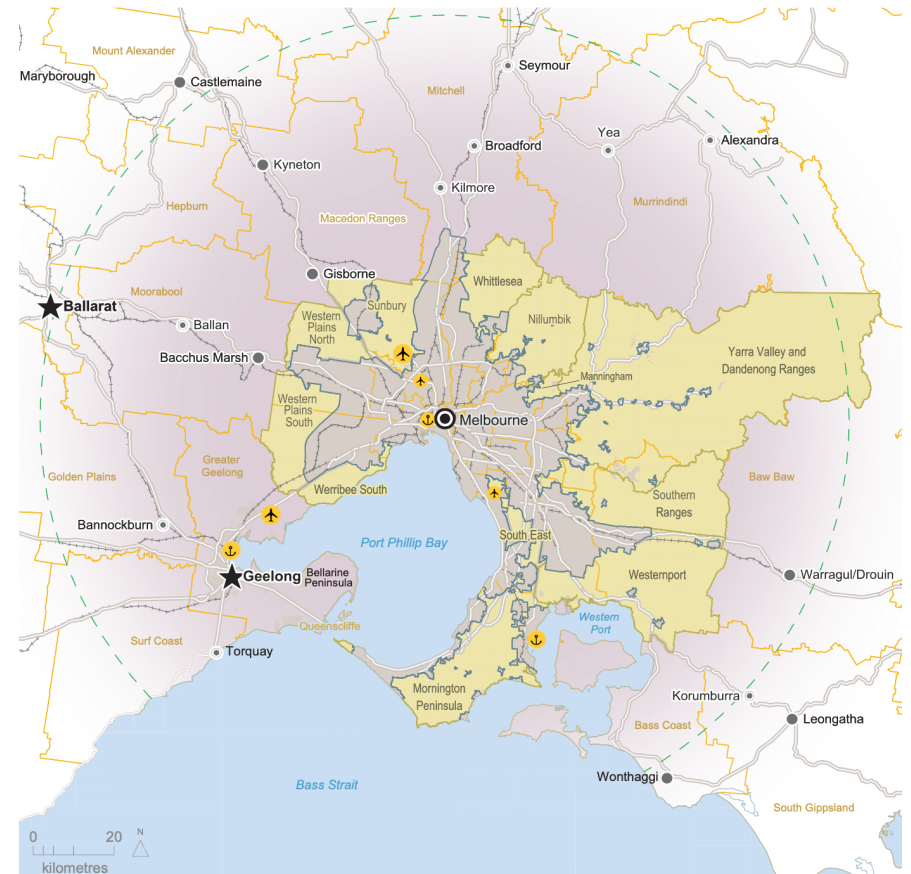
Green Wedges

The Metropolitan Planning Strategy for Melbourne, 2017-2050 proposed a plan for Melbourne's 'green wedges' and 'peri-urban areas'. Melbourne's green wedges and peri-urban areas are immensely important to the state's economy, community and environment and support a wide range of non-urban land uses and activities.

Planning tools that protect green wedge land include:

- Regulations for planning scheme amendments that alter the urban growth boundary or green wedge subdivision controls
- Core Planning Provisions for Metropolitan Green Wedge Land, which set out prohibited land uses and subdivision provisions
- Green wedge zones, which primarily include the Green Wedge Zone, the Green Wedge A Zone and the Rural Conservation Zone
- Green Wedge Management Plans, which are strategies that identify a vision, objectives and actions for the sustainable use and development of each green wedge.

Planning for identified distinctive areas within green wedges and peri-urban areas and ensure that they are protected and enhanced for ongoing use by present and future generations.





Water Cycle Management

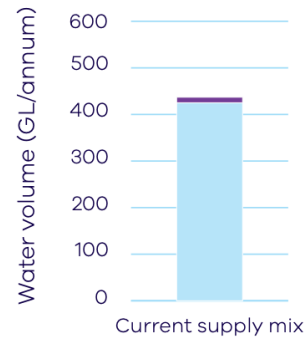
The Metropolitan Planning Strategy for Melbourne, 2017-2050 proposed the integration of urban development and water cycle management to support a resilient and liveable city.

The plan ensures considering the whole water cycle when planning for urban areas, through the following policies:

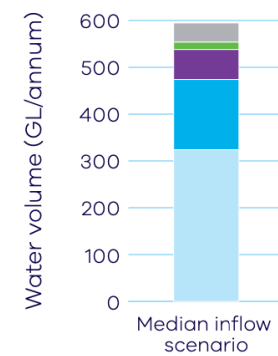
- Reduce pressure on water supplies by making the best use of all water sources - supports the use of all water sources, including stormwater, rainwater and recycled water, to ensure the city remains liveable and sustainable and to reduce reliance on drinking-water supplies.
- Improve alignment between urban water management and planning by adopting an integrated water management approach - change the way urban areas are designed, built and maintained by applying integrated water management planning in all development.
- Protect water, drainage and sewerage assets - Land area buffers around these assets need to be appropriately managed to ensure these assets are protected from urban encroachment.

Water supply scenarios to 2050

A Supply mix in 2015



B Potential mix needed in 2050



Source to be determined

Stormwater planned projects

Recycled water planned projects

Desalinated water

Catchment

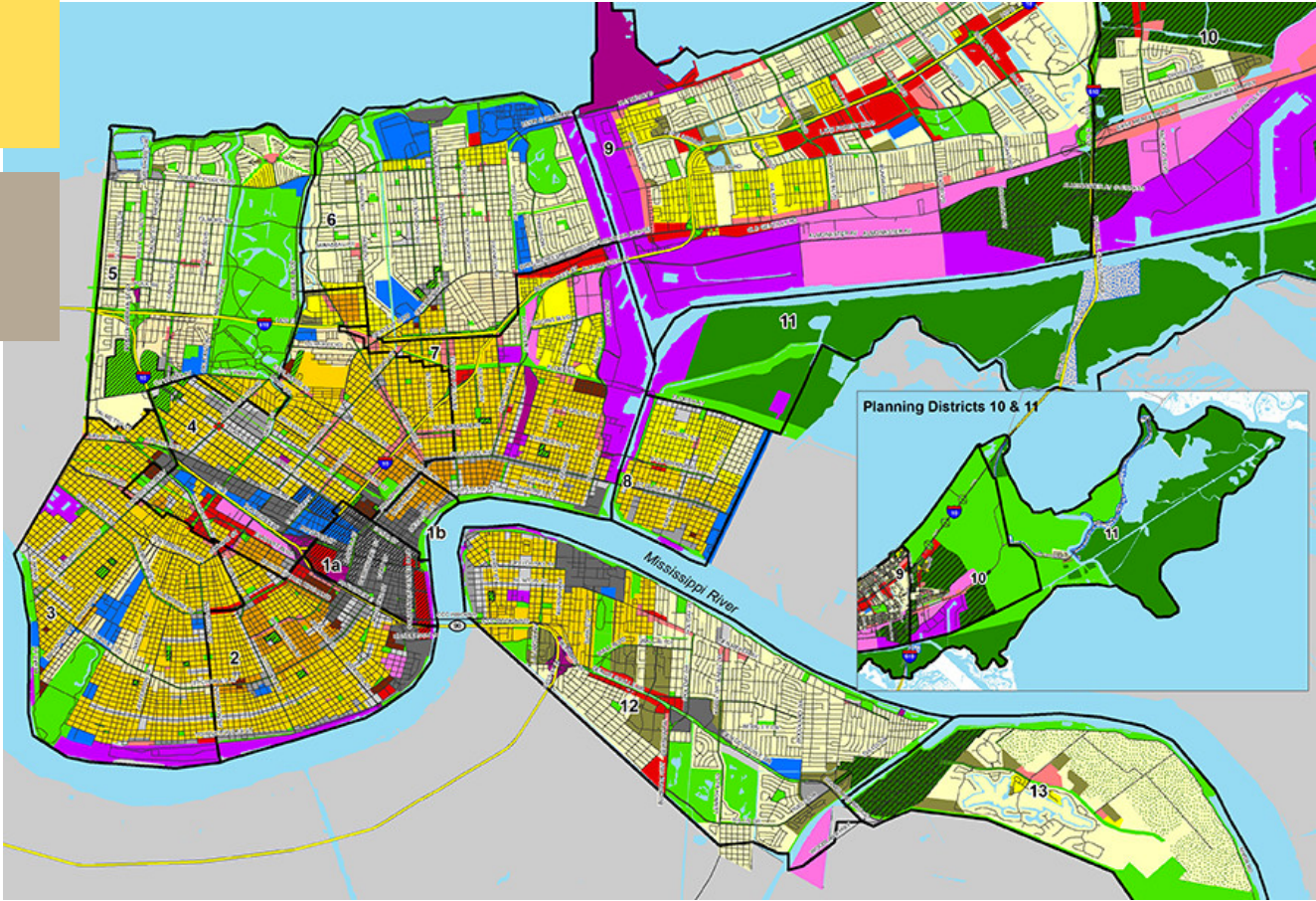
Plan for the 21st Century, New Orleans, 2030



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MOBILITY



Reference Source:
New Orleans Master Plan | City Planning Commission, City of New Orleans, 2018
Retrieved August 2022, from <https://masterplan.nola.gov/>



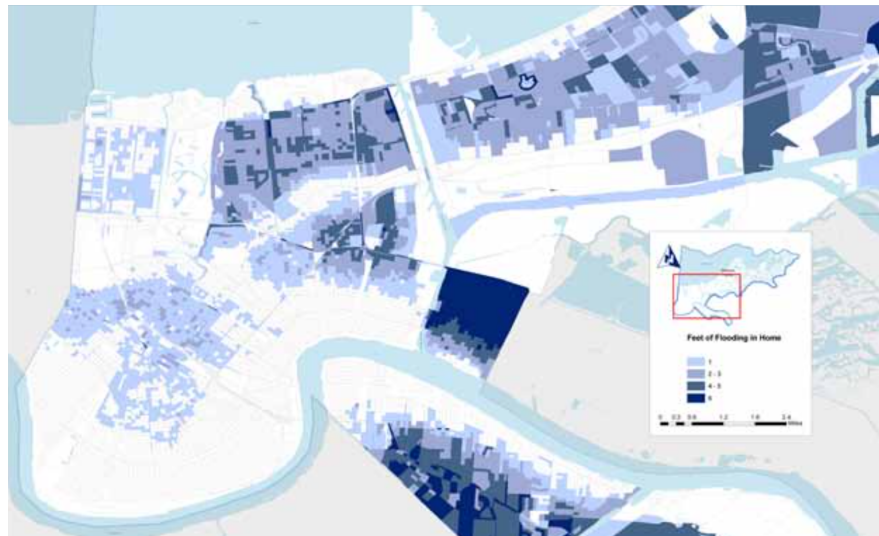
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Flood Resilient Housing

The Master Plan for New Orleans 2030 suggests that the City can advocate for increased flood protection while also upholding building code regulations that require individuals to raise buildings above flood levels.

All public buildings should be renovated or built to a standard such that they will be able to withstand a 1-in-500-year storm after the completion of the hurricane protection system in 2011.

The maps highlight those blocks that must be elevated beyond existing Advisory Base Flood Elevation (ABFE) Requirements to avoid flooding. The map on the left highlights those blocks whose houses must be elevated to avoid flooding from a 100-year storm with the current level of flood protection in place. The map on the right highlights the areas that will need to be elevated beyond ABFE's to avoid flooding from a 500 year storm in 2011 and thereafter.



Amount of flooding in ABFE compliant homes according to 2007 risk of 1 in 100 year storm



Amount of flooding in ABFE compliant homes from a 1 in 500 year storm in 2011



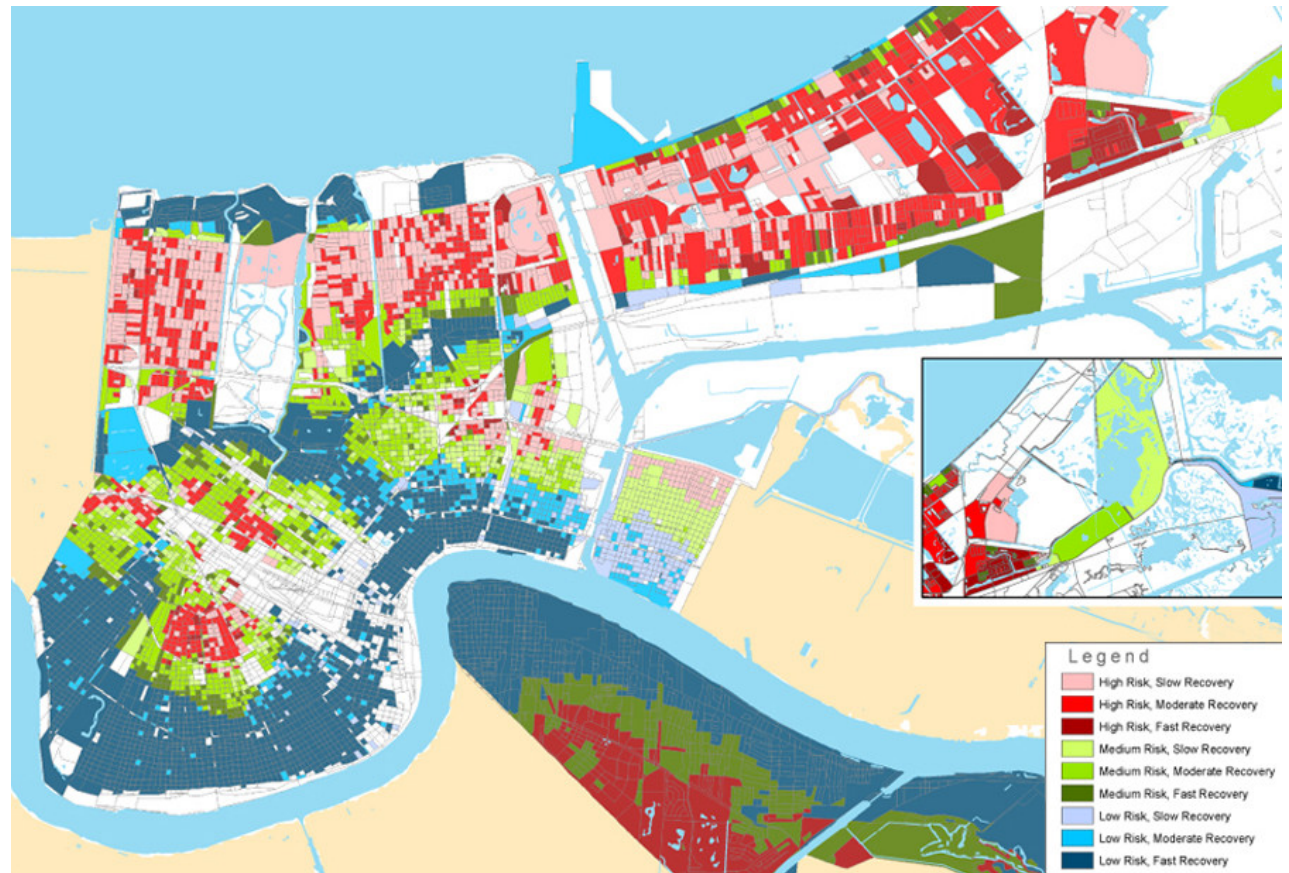
MOBILITY

Flood Resilient Transport Infrastructure

The Master Plan for New Orleans 2030 suggests to make capital investments and implement administrative strategies that ensure the resilience of the city's transportation infrastructure against future hazards.

The recommended actions include:

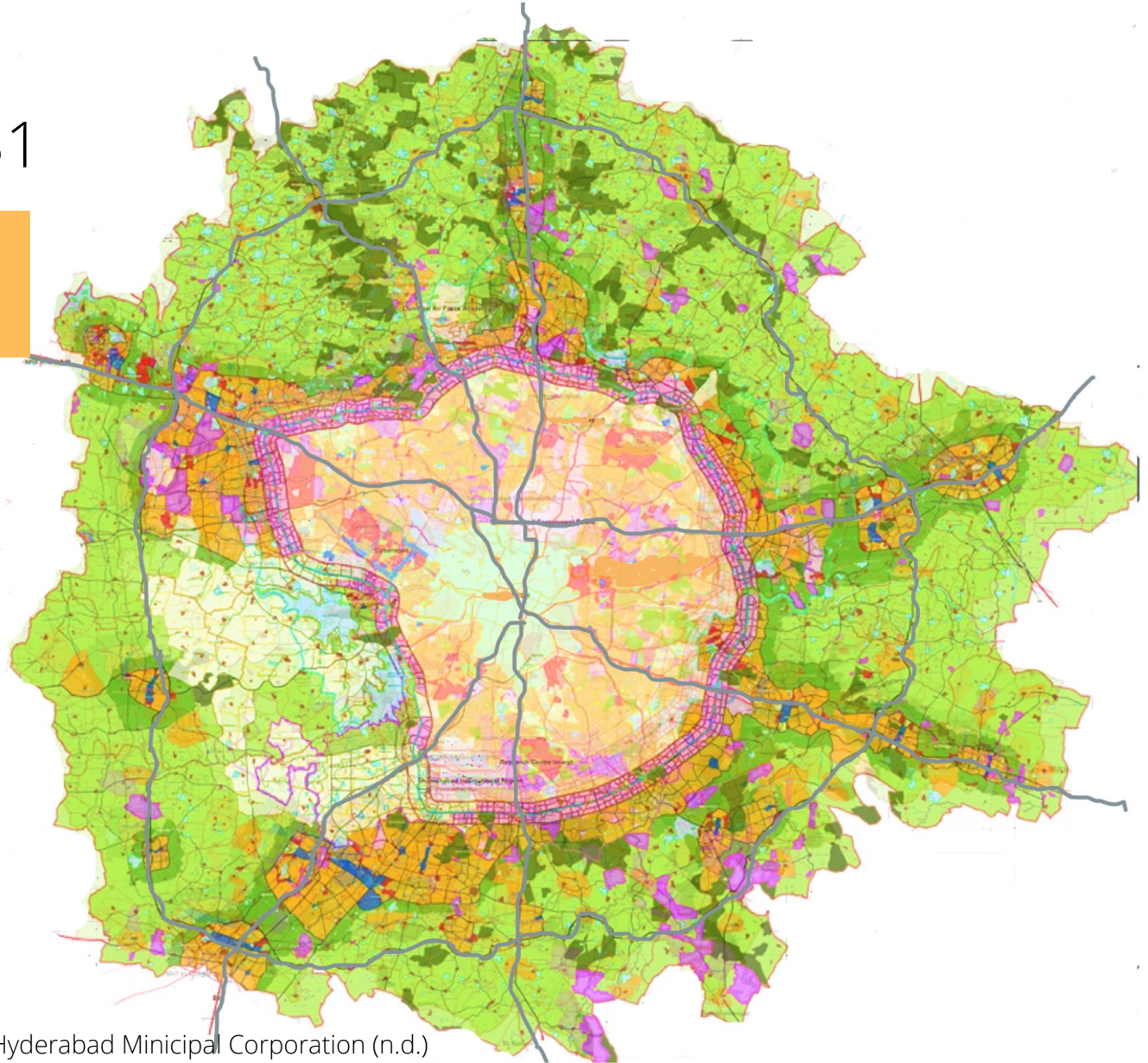
- Ensure that a thorough, timely, regularly updated plan is in place to secure bus and streetcar rolling stock from flooding.
- All transportation facilities are renovated, to ensure that critical building systems are elevated and those facilities are hardened against flood and wind damage.
- Where feasible, use construction techniques and materials allowing minimum withstand floodwaters, specially as roads are repaved and new drainage systems are introduced.



Master Plan Hyderabad, 2031



HERITAGE



Reference Source:
Master Plan Hyderabad 2031 | Greater Hyderabad Municipal Corporation (n.d.)
Retrieved August 2022, from <https://www.ghmc.gov.in/>



Transferable Development Rights

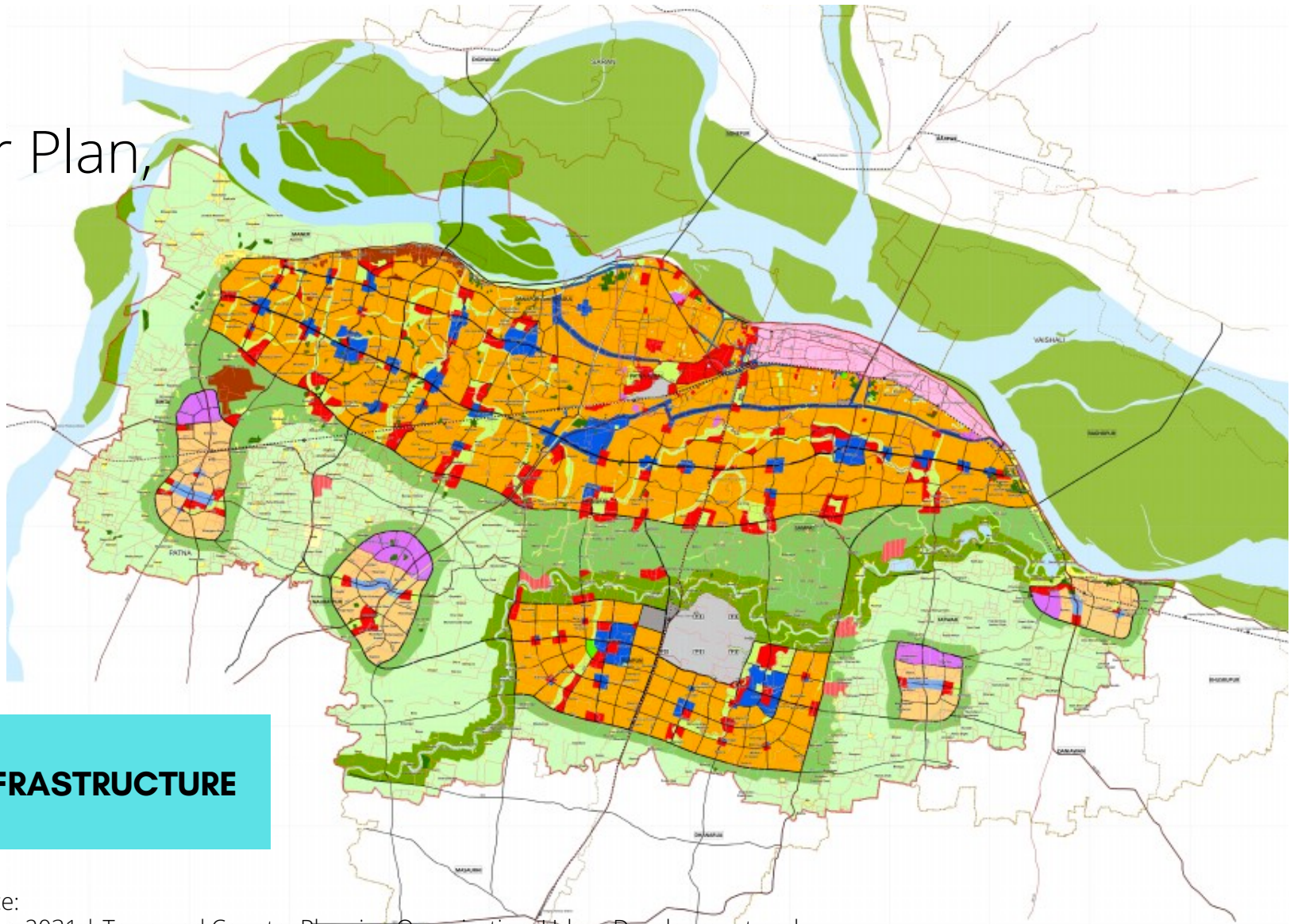
The Master Plan for Hyderabad has adopted 'Transferable Development Rights' to conserve its natural heritage zones. A number of these heritage zones have traditional water bodies that are excellent avenues for groundwater recharge.

Land owners of areas that fall under natural heritage zones are provided a TDR incentive up to 400 per cent of the land they surrender.

They also have the flexibility to sell the rights to a developer who already own land in the receiving area.



Patna Master Plan, 2031



INFRASTRUCTURE

Reference Source:
Patna Master Plan 2031 | Town and Country Planning Organisation, Urban Development and
Housing Department, Patna, Bihar, 2016
Retrieved August 2022, from <http://udhd.bihar.gov.in/PMP2031/data/pmp-2031-report.pdf>

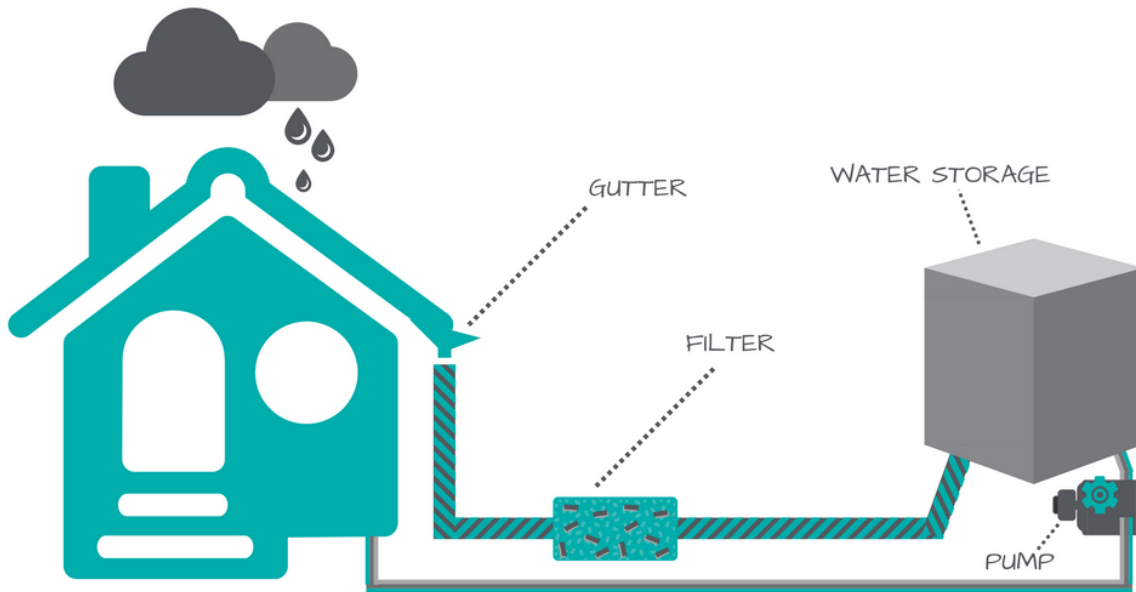


Water Harvesting

The Patna Master Plan 2031 proposed 'Water Harvesting' system for conservation and efficient utilisation of limited water resources available within the watershed.

The strategy includes:

- Short spells of high intensity/ heavy runoff/ low ground water recharging
- Tapping rainwater by harvesting it for recharging or direct use



Key components of Rain Water Harvesting system include:

- Catchment: surface (paved/ unpaved) contributing water to a system by directly receiving rainfall; eg. Terrace, courtyard, lawn or open ground
- Conduits: pipelines or drains (PVC/ Asbestos/ GI etc) carrying rainwater from catchment to harvesting system
- Filters: tank with different layers of sand/ pebbles for filtering water before reaching tank
- Storage Facility: Commonly used storage containers (RCC/ Masonry/ plastic etc) maintenance measures (cleaning/ disinfection etc) required for ensuring quality of water
- Recharge Facility: rainwater charged directly to aquifers through bore well, dug wells, recharge trenches and recharge pits







**Water and Environment Vertical
National Institute of Urban Affairs**

1st Floor, Core 4B,
India Habitat Centre, Lodhi Road,
New Delhi - 110003, India
(+91-11) 24643284/ 24617517 (ext. 214)
urvers@niua.org



National Mission for Clean Ganga

Ministry of Jal Shakti, Government of India
1st Floor, Major Dhyan Chand National Stadium,
India Gate, New Delhi - 110002, India
(+91-11) 23072900-901
admn.nmcg@nic.in

