

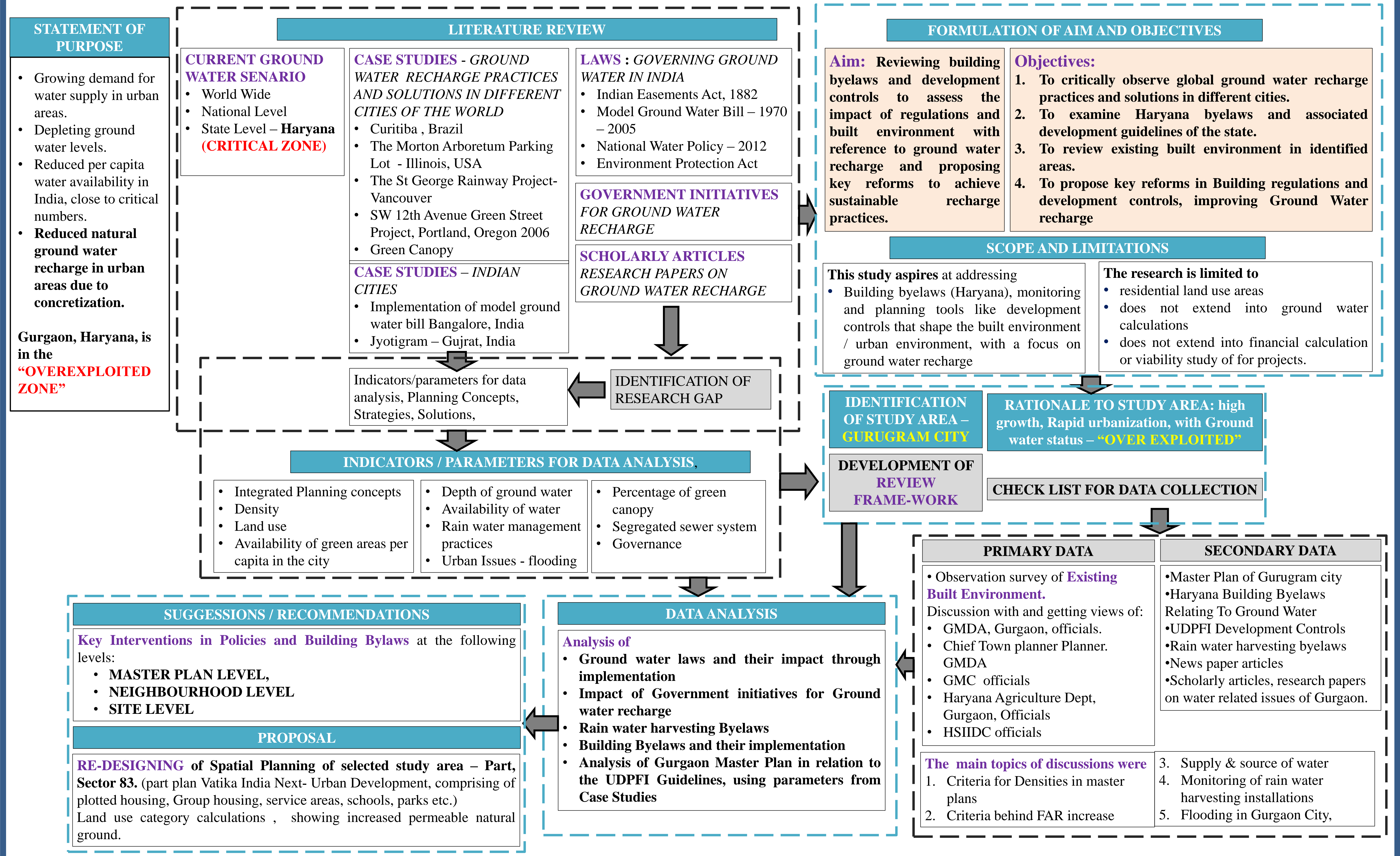
**RE-IMAGINING BUILDING BYELAWS AND DEVELOPMENT
CONTROLS IN THE CONTEXT OF SUSTAINABLE GROUND WATER
RECHARGE**

A CASE STUDY OF GURUGRAM, HARYANA



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HIGHLIGHTS OF LITERATURE REVIEW AND DATA ANALYSIS

CURRENT GROUND WATER SENARIO

• WORLD WIDE

Water most likely to cause wars in the 21st century - World Bank.

India- highest user of ground water in the world

• NATIONAL LEVEL

Water scarcity threshold 1000cum/capita annually- WHO. Per Capita water available in India by 2050 – 1140cum

• STATE LEVEL –

Haryana (CRITICAL ZONE)

CASE STUDIES - GROUND WATER RECHARGE SOLUTIONS IN DIFFERENT CITIES OF THE WORLD

- Creation of green infrastructure through master plan controls - land use, densities, and integrated green concepts in planning,
- Use of green areas & planting of trees for water management.
- Use of TDR
- Use of bioswales / raingardens to naturally filter water and adopt slow, spread and sink strategy for water management
- Using surface runoff to revive old streams
- Segregated sewer pipes
- Managing storm water runoff in high traffic urban areas
- Green Canopy for optimum ground water recharge

LAWS : GOVERNING GROUND WATER IN INDIA

- **Indian Easements Act, 1882** – Land owner can withdraw unlimited quantities of water from under his land
- **Model Ground Water Bill – 1970 – 2005** – Addresses only new wells is silent on existing wells.
- **National Water Policy – 2012** – Advocates rain water harvesting and water conservation, direct use of rainfall, conservation and restoration of river, water bodies.
- **Environment Protection Act** – Led to the creation of the CGWB, that has made mandatory RWH/ Roof Top RWH

CASE STUDIES - IMPLEMENTATION OF MODEL GROUND WATER BILL

• Bangalore, India

Implementation is entirely by government authorities who are under staffed, lacking necessary skills and data; the people who use groundwater have no role in decision-making or implementation. Source of funding is unclear.

• Jyotigram – Gujrat, India

It highlights the corruption and violence from the farmers, lack of political will, and tradition of giving subsidies

Controlling the existing ground water usage is a difficult long term goal.

GOVERNMENT INITIATIVES FOR GROUND WATER RECHARGE

• MODEL BILL 2005 – DoWR

The Bill addresses the critical / overexploited areas, restricts new water abstraction activity, but is silent on the current groundwater use malpractices

• Model Building Bye-laws, 2016 MOHUA making RWH mandatory –

These RWH installations are only inspected prior to giving the building NOC. As they are private, GMDA does not maintain / monitor them after NOC. In the absence of maintenance, they do not function.

Master Plan for Artificial Recharge to Ground Water in India 2013 - CGWB –

Proposes RWH Installations, has a huge cost and claims water level increase if 0.5m annually. - It addresses only the deep aquifer, no attempt to bring the ecosystem in balance holistically. The RWH structures come at a high cost and if they are not monitored, they will not work to 100% capacity. They may also pollute the ground water. National Green Tribunal - directed states to maintain and restore water bodies The work was started on all the 647 water-bodies mentioned in the order.

INDICATORS / PARAMETERS FOR DATA ANALYSIS

- Integrated Planning concepts
- Density , Land use
- Green areas per capita in city

- Availability of water
- Water management
- Urban Issues - flooding

- Green canopy
- Segregated sewer system
- Governance

REVIEW FRAME-WORK

PRIMARY DATA

SECONDARY DATA

INTERVIEWS WITH GOVERNMENT OFFICIALS

Dr. K.K.YADAV, (FORMER CHIEF TOWN PLANNER, HSIIDC)

“Rain Water Harvesting is not working, inspite of the byelaws. Borewells are not functional, not maintained, it is an eyewash”

The population densities given in the URDPFI Guidelines- “these are generally based on studies of the trends in existing cities...No, they are not based on the sustainable carrying capacity of individual areas....”

DR. SUMER RAO (CHIEF HYDROLOGIST GMC) “GMC is stretched inspect their own RWH borewell installations. Last year there was a onetime maintenance drive.”

MR. ARORA, (GMDA) CHIEF ENGINEER) “Rainwater harvesting and recycling of sewage water are a must to meet the growing demand,” **He rued that laws regarding rainwater harvesting and Sewage Treatment Plants were not being implemented in letter and spirit.**

MR. RAMAN SHARMA (CHIEF ENGINEER, GMC) Private RWH Installations are the responsibility of the owners who must maintain them.

VATIKA LIFESTYLE HOMES, CHIEF MAINTENANCE OFFICER

Municipality checks – one time before Building NOC. **No checks have happened subsequently.**

20 Pits, requires about 5 – 6 lakhs rupees for maintenance per year. Most societies are unwilling to spend as much. Maintenance is most important. The rain water usually carries silt with it and clogs up the system. Hence de silting Is important for efficient working of the pits

MASTER PLAN 2031 Brief Note – Description Of Land Uses & Environment :

Master Plan 2031 Focus - Commercial and industrial zones, road linkages, population densities, and commercial concerns.

Landuse – Focus on the provision of land use under different heads to accommodate needs of a projected population.

Conservation zone - Conservation zone and environmental concerns of the Aravalis and the Sultanpur sanctuary to be kept in mind while planning.

Open Spaces - The target percentage of open spaces at the city level are not mentioned, though at the sector level 2.5sqm per person is mentioned.

Grey water - There is a mention to target zero discharge of water and use of grey water.

ANALYSIS OF GURUGRAM MASTER PLAN

The carrying capacity of the land cannot sustain the population With population increase Residential land use has increased and agricultural land use has decreased over the years.

The master plan allows a density of 250pph, and is increasing FAR without any sustainability considerations.

Integrating planning and development controls with Environment sustainability concepts seems to be absent. Aim is solely commercial benefits, and catering to the growing population. Integrated approach towards sustainable development is missing.

WATER RELATED ISSUES IN GURGAON CITY

Far Increase In Gurugram – Sustainability Not Considered
Flooding - due to concrete surfaces

Scarcity Of Public Parks – leads to no recharge

Depleting Ground Water Lack Of Monitoring – The RWH installations are not maintained

Combined Drainage System

- Increases the load on STPs

Lack Of Integrated Planning

- No Un-sustainable urban development

REVIEW OF HARYANA BUILDING BYELAWS AND DEVELOPMENT CONTROLS.

DENSITY

PARKS OPEN SPACES

RAIN WATER HARVESTING

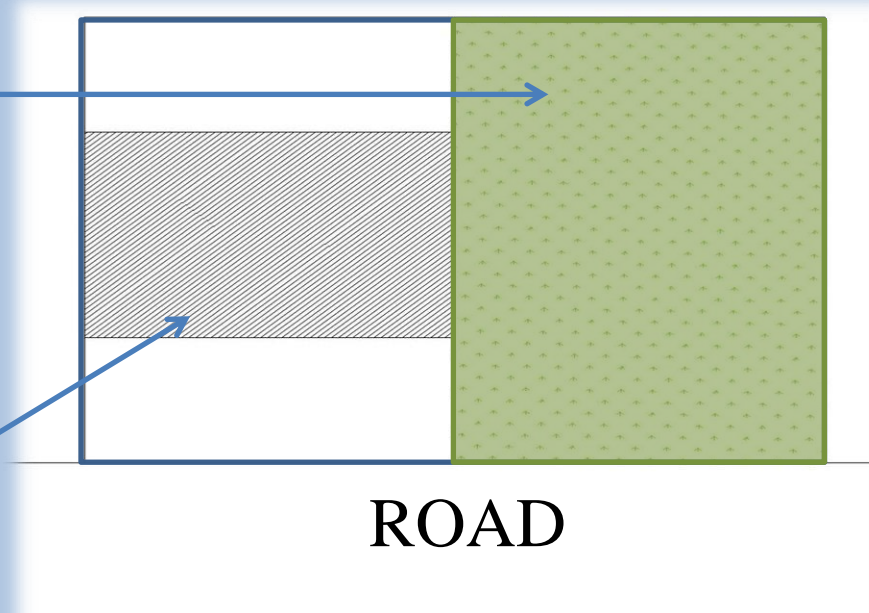
GROUND WATER RECHARGE

PLOTTED HOUSING

GROUP HOUSING

BASEMENTS

GREEN CANOPY

RECOMMENDATION	ADVANTAGES	RECOMMENDATION	ADVANTAGES
<p>1. DENSITIES to be determined after a study of the carrying capacity of the land, in terms of per capita availability of water with sustainable use of resources. Only as much ground water should be extracted as is possible to recharge naturally.</p> <p>2. INTEGRATED PLANNING - Adapting developmental approach to account for environmental sustainability can help maintain the ecological balance. All Master Plan to be based on integrated environmental planning concepts, weaving sustainability into all planning decisions. Eg.- green Infrastructure, walkable neighbourhoods, urban Farming etc. to ensure Natural ground water recharge. To ensure the above, Master Plans to require mandatory approval from “Ministry of Environment and Forestry”.</p>	<p>1. Densities specified in the master plan will control the growth of the city beyond the carrying capacity of the land, OR, water required for the city will be ascertained before expansion.</p> <p>2. Sustainability concepts adopted at the Planning stage, will have the maximum Impact. These policy level decisions will percolate down to the site level at implementation stage!</p> <p>The final product of urban built environment will show sustainable patterns of natural resource consumption.</p>	<p>PLOTTED HOUSING - TWIN PLOT, Using TDR</p> <ol style="list-style-type: none"> Two plots amalgamated as single plot. One plot is developed as per existing building regulations. Other plot is reserved for agriculture related purposes, with 100% natural ground cover. Development rights of this plot can be sold, as per Master Plan Any FSI Increase in the future can also be sold. Plots cannot be subdivided in the future Upto 10-15% of plotted housing to be in the form of twin plots depending on scope of TDR possible. 	<ol style="list-style-type: none"> Creation of no development natural ground area, privately maintained, that will enhance natural ground water recharge and reduce surface runoff, along with other environmental benefits. This will encourage other green city concepts, such as use of grey water, urban farming etc.
<p>PUBLIC PARKS – A Mandatory area of 10 – 12sqm per person to be built into the Master plan.</p>	<p>Parks will ensure natural ground, water bodies, use of excess grey water, tree cover, etc. to aid in Ground water recharge along with many other advantages.</p>	<p>The % of Group Housing in sectors may be increased with increased FAR, to promote high rise high density compact residential development. To be regulated by the Master Plan</p>	<p>Compact developments help free up space for green areas and public parks.</p>
<p>RAIN WATER HARVESTING Managing of 100% rainwater as and where it falls through a combination of semi permeable surface material, bore holes, bio swales, rain gardens etc. on all:</p> <ol style="list-style-type: none"> ROADS - Private roads to be managed by private owners & Public roads to be managed by local authorities. SURFACE PARKING - Private Parking lots to be managed by private owners & Public Parking lots to be managed by local authorities. Monitoring of, State owned and private, Existing Rainwater installations is to be the mandatory responsibility of the local authority. 	<ol style="list-style-type: none"> Ensures balanced groundwater recharge of not only deep aquifers that supply water to wells for human consumption, but also recharge of the vadose zone, to maintain discharge to surface water, vegetation, and other habitats that make up the ecosystems connected to the groundwater system. Cost effective. Capital and maintenance costs to be included in the infrastructure project costs. Monitoring / maintenance work-loads can be shared by the horticulture departments. Where Drainage pipe systems are common, volume of water directed to the STP for treatment is reduced making it more cost effective <p>Monitoring of, Rainwater installations will ensure their healthy functioning and intended impact of the regulation.</p>	<ol style="list-style-type: none"> 25% of green canopy to be achieved through tree plantation, along roads, & in group housing developments. Private developers to be given incentive in the form of 3% additional FAR to achieve above this milestone. 1.5% FAR for 30% green canopy & 3% FAR FOR 40% green canopy 	<p>Rain water infiltration in the ground happens only with the presence of trees, One mature tree can intercept more than 1500 liters of water in a year, Aiding flood prevention and natural ground water recharge.</p>
		<p>Private developers to be given incentive in the form of 3% additional FAR to achieve above 40 % of natural ground open space, 50% of this space must be as a single open space, with dimensions as per existing byelaws.</p>	<p>Ensuring natural ground, and consequently ground water recharge interwoven in built environment.</p>
<p>All the above measures will work towards SDG 12 that stresses on ensuring sustainable consumption and production patterns. THE FINAL PRODUCT OF URBAN BUILT ENVIRONMENT WILL SHOW SUSTAINABLE PATTERNS OF NATURAL RESOURCE CONSUMPTION.</p>			
<p>NOTE– Refer to slide nos. 15 & 16 for analysis of the Byelaws Refer to slide nos. 17, 18,19, for a proposal based on the above recommendations</p>			

PART SECTOR 83 - REVISED AS PER RECOMMENDATIONS

RECOMMENDED GROUP HOUSING WITH INCREASED FAR

12 ACRES LAND UNDER PLOTTED HOUSING IS CONVERTED TO GROUP HOUSING. Additional units are available after accommodating all plots displaced. HENCE SOME MORE PLOTTED HOUSING SPACE IS FREED TO MAKE A GREEN PARK. **TOTAL DENSITY IN THE SECTOR REMAINS THE SAME!** AREA OF BASEMENT IS RESHAPED AND REDUCED. NATURAL GROUND AREA IS INCREASED. HENCE GROUND WATER RECHARGE IS INCREASED. STILT & PODIUMS ARE ADDED TO ACCOMMODATE PARKING.

Existing STP – Grey water is used for irrigation and flushing, car wash etc.

10% OF THE PLOTTED HOUSING CONVERTED TO TWIN PLOTS. THE FAR SOLD TO LIFESTYLE HOMES, WHERE BUILDING HEIGHTS ARE RAISED WITHIN SAME OPEN SPACES TO ACCOMMODATE THE EXTRA UNITS.

GREEN CANOPY AREA INCREASED WITH TREE PLANTATIONS IN STREETS AND IN GREEN OPEN SPACES. TREES HELP IN RETAINING GROUND WATER AND SLOWLY DISCHARGE INTO THE GROUND WATER.

BIO SWALES ON THE SIDES OF STREETS COLLECT AND FILTER SURFACE RUNOFF WATER. OVER FLOW FROM THESE GOES INTO THE RAIN GARDENS, WHICH ALSO HAVE RWH PITS SO THAT ANY EXCESS WATER DUE TO FLASH FLOODS OVER FLOWS INTO THE PITS. 100% OF RAIN WATER IS USED FOR GROUND WATER RECHARGE

BIO SWALES AND RAIN GARDENS FILTER SURFACE RUNOFF WATER. AND ALLOW SLOW RECHARGE OF THE GROUND WATER / VADOSE ZONE PROVIDING HOLISTIC RESTORATION OF THE ECOSYSTEM



100% RAIN WATER MANAGEMENT AS AND WHERE IT FALLS- ON SURFACE PARKING AND ROADS

SURFACE PARKING TO BASEMENT PARKING

LIFESTYLE HOMES

Source –adapted from google image

- LEGEND
- 1 PLOTTED HOUSING
 - 2 GROUP HOUSING
 - 3 SCHOOLS
 - 4 SERVICE AREAS
 - 5 PARKS

- 6 TWIN PLOTS
- 7 BIOSWALES
- 8 RAIN GARDENS
- 8 PERMEABLE SURFACE PARKING

- GROUND COVER
- ROADS
- PAVEMENTS
- SURFACE PARKING
- OPEN SPACE
- GROUND COVER
- PLOT LINE
- BASEMENT LINE

PERMEABLE & IMPERMEABLE AREA PIE CHARTS

