Water & Infrastructure Masterplan of the Residential Zone Sector 1 & 2 in Auroville
Topics which have been studied

• Drinking water (DW)
• Waste Water (WW)
• Irrigation / Garden water (IW)
• Rainwater Harvesting (RW)
• Stormwater Management (Storm W)
• Fire water supply (FW)
To start up:

A. Study of the existing Infrastructure
B. Evaluation of the existing Infrastructure
C. New Proposals/ Solutions for the new projects
D. Combining „old & new“ => growth of Auroville => LEGO
E. Not an easy task
Total Solution “DW concept 2012”

- Ring System
- Double pipe
- 2 main water works stations
- Constant pressure of 2 bar
- System will be fed by:
  a) selected bore wells
  b) treated Rainwater
  c) desalinated seawater
- Design through Profis
  a) Hydraulic pipe Dia calculation
  b) Costs
  c) etc.
Almost every community is connected to the large OHT near Invocation

300 to 400 l/d and person => very high DW consumption!

- Tower 140 m³, UGT 200 m³
- 4 Wells => 30 to 35 m³/h
- Booster pump + generator backup
The present wells deliver app. 455 m³/d
=> Demand = 150l/d => sufficient for 3000 people
=> Demand = 300l/d => sufficient for 1500 people

“All efforts have to be taken to cut the present high consumption”

Conclusion & Recommendations:

- The present pumping capacity is sufficient for the 1st phase of residential zone 1 and 2. for app. 1500 people
- A new storage tank of 200 m³ has to be build.
- It is advisable to drill a new well in the Area in the near future
- All wells connected to the system must be calibrated => proper yield test
- The piping network is old and from a low quality and needs to be changed. It must be a looped system which can be integrated in the DW-concept 2012

Problems Phase 1:

- Water Works Auroville (WWA) is not yet functioning!
- Costs as per draft estimated => 77 lakh Rupee
Conclusion & Recommendations

“The present system, storage tanks, well yield etc. is insufficient“

- The present pumping capacity must be increased => not possible due to the fact that the aquifers in the area are not sustainable
- Solution: Hook on the DW concept 2012 Network!

Problems:

- The water supply must have first priority and land securing for setting up a desalination plant has to happen at the earliest. Furthermore, a passage from the beach towards the city must be found and secured.
Present WW scenario in the study area

Each community/settlement has its own treatment, Arati, Surrender (part) and Invocation are connected on one system (Image left)

Results are vary from good to “no water comes out”

- Invocation: Design load 40 m³ equivalent 150l/d and person
- Prayatha wwt plant => difficult to understand
Questions?
Waste Water concept, Sector 1 & 2

“The performance of the exiting wwt-systems is more or less acceptable“

Problems:

- Existing Systems are on a limit
- Design load is unclear (Prayathna, Creativity, etc.)

Conclusion:

- The long-time-solution is to have ONE Semi-central system for Sector 1 & 2
  
  + Less maintenance, less headache, ONE Service point, only!

  + Responsibility of the treatment plant => Water Works Auroville => not the Individuals

  - Investment for sewage piping network
Waste Water concept, Sector 1 & 2
Problem: Technology of treatment

1\textsuperscript{st} Option: DEWATS System $\Rightarrow$ Aravind Eye hospital

Advantages:

+ *No electricity is needed, flow by gravity*
+ *Better maintenance and better sustainability for the future city*
+ *Less risk of pollution through leaking tanks etc.*
+ *Powerful low costs system*
+ *Extendibility $\Rightarrow$ LEGO SYSTEM (plug & play) possible*

Disadvantages:

- In the beginning higher Investment costs due to longer pipelines
- Treated water has to be pumped back to the “source” for the use in the gardens
- Size requires technical equipment like screening
- Sensitive against chemicals and disinfection materials

*Estimated costs $\sim 2,45$ crore (with piping & GW)*
2nd Option: Membrane Bio Reactor MBR

Advantages:

+ High quality of the treated waste water => suitable for RO
+ Compactness - Small footprint, 1/3 of space of conventional plants
+ Robustness - resistance to shock sewage loads
+ Reduced sludge - the production of solid waste is reduced, limiting disposal costs
+ Economy - advanced aeration and membrane technology minimize power demand
+ Long lifetime of membrane, 5 to 7 years, fast installation

Disadvantages:

- Small amounts of chemicals have to be used to clean the membrane, app. every 15 days. These acids break down in a short period of time
- Monitoring has to be done regular
- Electricity is needed
- Sludge has to be removed at least once a week

Estimated costs ~ 1,40 crore (with piping & GW)
Recommendation:

The final decision can only be taken after a full comparative study inclusive “dynamic - cost – analyzes” based on a time frame of 30 years has to be carried out.
Irrigation system

The present Irrigation technology is wasting 70% to 80% of water
=> 1" hose pipe flow in 1 h = 7500 l/h => sufficient for 4000 m² Garden

“All efforts have to be taken to improve the Irrigation technology”

Drip Irrigation

Hydro-culture
Rainwater Harvesting concept for the Residential Zone

„Auroville has no choice, RW has to be incl. as future source for DW supply”

Recommendations:

- RW harvesting is cheap => storage is costly => that’s the problem
- Storage tanks should be build according to the => LEGO SYSTEM
- Size of the storage tanks should be 10% of the maximum possible RW in the first Phase, 20% in the second, 30% in the third etc.
- Time frame for implementation 10 years
- Excess RW should be Infiltrated into the Ground => Infiltration Test Area
- NO RUNOFF FROM THE AUROVILLE PLATEAU!!

Problem:

Estimated costs ~ 11,9 crore (all-in), Final Sector 1 & 2
Stormwater Management for the Residential Zone

„Stormwatermanagement is the controlled runoff of heavy rainfall”

Recommendations:

- StormW should be controlled through proper landscaping

Draft estimated costs ~ 1,15 crore, Final Sector 1 & 2
Stormwater Management for the Residential Zone

Pond-to-Pond connection

Roadcross, Ford

Controlled Runoff
Fire water supply for the Auroville Township

„Indian Rules and Regulations for Fire Fighting are clear defined, but so far not followed”

Inside buildings:

- Fire fighting rules etc. must be integrated during the planning of the buildings => IS National Building Code 2005, Fire Strategies:
  - => CO₂ Fire Extinguisher => Hose reel system => Hose reel extinguisher

Outside buildings:

- Yard Hydrant system with Hose box => DW concept 2012
- Fire water tanks

„Auroville must build up a Fire Fighting Team NOW, => we must call an expert“

Estimated costs ~ 1 crore to start up
Total estimated costs for the water infrastructure of the Sector 1 & 2, 4500 people

DW $\Rightarrow$ 0.77 crore
WW $\Rightarrow$ 1.4 to 2.45 crore
IW $\Rightarrow$ ??
RW 10% $\Rightarrow$ 11.9 crore
StormW $\Rightarrow$ 1.13 crore
FireW $\Rightarrow$ 1 crore

Total: $\sim$ 17 crore $\Rightarrow$ 35 to 40,000 per Inhabitant
Thank You for your attention!

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- German Association for Water, Wastewater and Waste
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