Policy w.r.t. water sources, demand types and treatment options

Water is required for various purposes in a development, which can be grouped in 4 key usage categories:

1. *Drinking (all activities which have direct human touch or where water enters into the human body e.g. basin, shower, kitchen, swimming pool)*
2. *Limited human touch (e.g. water bodies, water walls, fountains, open landscaping)*
3. *Flushing (activities which are unlikely to have any human touch e.g. flushing, dense landscaping)*
4. *Mechanical Cooling e.g. Cooling towers etc. for commercial towers*

Depending of which of these 4 categories the usage is meant for, the water can have different permissible thresholds of various chemical and biological matter:

Table 1.1

Maximum limits/Type of Water usage	Unit	Drinking	Limited Human Touch	Flushing	Mechanical cooling
Colour		5	Acceptable	Acceptable	Acceptable
Total Hardness	Mg/lit	<300	<500	<500	<300
BoD	Mg/lit	<3	<10	<30	<5
CoD	Mg/lit	<15	<30	NIL	<30
TDS	Mg/lit	<150	<1000	<2100	<1500
Residual Chlorine	Mg/lit	0.2	<1	>1	>1
E. Coli	Mg/lit	0	0	NA	NA
Turbidity	NTU	<5	<10	NA	NA
pH		6.5 – 8.5	6-9	6 – 9	6 – 9
TSS	Mg/lit	NA	NA	<5	<5

Water is available from following 5 primary sources:

1. Municipal Water
2. Ground water (bore well, open well etc.)
3. Tanker
4. Recycled water (post first usage within the development)
5. Rain water from non-landscaped areas (limited source)

Some of the commonly known treatment methods and their key functionality are as follows:

Table 1.2

Treatment Method	General Input water type/characteristics (mg/lit)	General Output water characteristics (mg/lit)	Capex Range / drivers (Rs./KLD)	Opex Range (Rs/KLD)	Suitable For
STP with secondary treatment (Type of STP: Conventional / SAFF)	Suspended Solids: 250 BOD: 250-300 COD: 450 – 600 pH: 6.5 – 8.5	SS: 10 – 20 BOD: 10 – 30 COD: <100 pH: 7 – 8 oil & Grease <5	10,000/- to 12,000/-	8/-	Flushing
STP with tertiary treatment (Type of STP: MBBR/MBR)	Suspended Solids: 250 BOD: 250-300 COD: 450 – 600 pH: 6.5 – 8.5	SS<5 BOD<5 COD<30 pH: 7 – 8 oil & Grease <5	15,000/- to 22,000/-	10/-	Limited human touch, Flushing, Mechanical Cooling
Reverse Osmosis (RO)	TDS <= 5000 mg/l	TDS <150 Ph : 7 – 8	10000/-	15/- to 20/-	Domestic
UV (Usually combined with RO or STP with tertiary treatment)	UV treatment kills bacteria hence these parameters are not applicable to the same. However UV treatment is required where STP treated water is expected to be used for 'limited human touch' usage.		800 - 1000/-	1/-	As per applicable used for RO or STP with tertiary treatment

It is essential to map out a water balance which takes into account the quantity available from the various sources, their input characteristics, the demand based on the aforesaid 4 categories and how to match the sources and the demand using various treatment methods. The treatment methods need to be determined taking into account both their capital cost and their operational costs. The goal is to ensure that all facilities in the development (inside the unit and outside) can operate over the long-term within the limits of CAM that has been set (with normal inflation).

The multi-source, different demand water balance needs to be finalized prior to the closure of concept design for the MEP Services.

Once the projects input, storage and treatment systems have been decided, it is necessary to commission some of these systems in the first 6-9 months from start of construction at the site to ensure that this capex investment can be used to generate construction water and allow quicker/smooth construction.

Notes:

1. MBBR /MBR based STP shall be used for commercial towers and townships developments wherein treated water is planned to be reused for Mechanical Cooling/ Limited Human Touch/ Flushing. MBBR/MBR treated water can also be used for construction purposes.

2. Conventional system /SAFF based STP is cost effective but recommended for projects where there are no water bodies / huge landscape works and water is planned to be reused only for flushing. If UV sterilizer is added to such system, it can be used for Limited Human Touch usage. Further, if RO is added to convention / SAFF system, the output water can be used for construction usage.

3. Bore well / Open well water may be possible to use for Drinking usage with RO treatment – however, this is subject to chemical analysis of the water source and designing of treatment system to ensure that the required chemical characteristics specified in Table 1.1 above are fulfilled.

4. Rain water from non-landscaped areas (viz. which does not mix with fertilizer chemicals) may be possible to use for Drinking usage after Softener treatment - however, this is subject to chemical analysis of the water source and designing of treatment system to ensure that the required chemical characteristics specified in Table 1.1 above are fulfilled.

5. Drinking water tanker can be used for Drinking or Limited Human touch usage without any treatment.

6. Regular water tanker can be used for Flushing or Mechanical Cooling without any treatment. It may also be possible to use this water for Limited Human touch usage, but only after chemical analysis of the water source and designing of treatment system to ensure that the required chemical characteristics specified in Table 1.1 above are fulfilled.

7. It is recommended that any action w.r.t. to ground water utilization (including bore / open well) is done as soon as possible and definitely within the first 6-9 months after start of construction on site.

8. Attached format to be used for summarizing the water system.

Water Usage Synopsis

Used within Development

Sr No	Input	Estimated Daily Quantity (Ltrs)	Pre-Treatment Storage Capacity (if any) (Ltrs)	Treatment Details	Usage	Estimated Daily Quantity (Ltrs)	Storage Capacity (Ltrs)
1	Municipal Water				a. Drinking		
2	Ground Water				b. Limited Human Touch		
3	Tanker				c. Flushing		
4	Recycled Water				d. Mechanical Cooling (if applicable)		
5	Non-landscape Rain Water				e. Fire Fighting		

Use Arrow (→) to link Input and Usage

Discharged Outside Development

Sr No	Input	Discharge Quantity (Ltrs)	Discharge Point
1	Landscape Rainwater / Storm Water		Storm Water Drain
2	Excess Recycled Water		Sewage Drain