



**PROCEEDINGS OF THE GOVERNMENT OF KARNATAKA**

**Subject:** According Approval for Urban Waste Water Reuse Policy.

- Read:**
1. Government Order No.UDD 435 PRJ 2014, dated:08.03.2016.
  2. Letter No.KWB/ TEC/ WWRU-Correspondence/ Vol-II/ 556/ 2017-18, dated:07.06.2017 from the Managing Director, KUWS&DB.

\*\*\*\*\*

**Preamble:**

Drinking water supply is one of the prominent duties of the Urban Local Bodies. At present, due to decrease in underground water, scarcity of surface water and other reasons, the quantity of availability of water is declining day by day, thereby the Urban Local Bodies are facing difficulty to supply fixed and necessary quantity of drinking water. By using the processed waste water for other uses, factory use, except domestic use, very precious drinking water could be saved for the use of citizen.

Bengaluru is a large city than any other cities in the State and it is estimated that at about 80% of waste water is being producing only in Bengaluru city, itself. In the report of the Central Environment Pollution Control Board -2009, it is stated that waste water treatment plants are not utilizing at its full extent in almost all cities and working only for at around 72%. Since more than 75% of waste water produced from class-1 and class-2 cities, is flowing to tanks or other water sources without processing, environment pollution is happening at a large amount and it is considerably fatal to the public health. Therefore, it is essential that the Urban Local Bodies have to establish the Water Treatment Plants according to the guideline/formulas prescribed by the State Environment Pollution Control Board and maintain them to reach the quality of prescribed processed waste water.

The demand for water is increasing in the State due to increase in population, urbanization and industrialization and water supply is declined and thereby stressed situation has been created. At the same time, the demand quantity is found to be increased than the flow of water in river basins. Out of the cities of State, a policy is necessary to search the alternative source of water for which it is possible to fulfilling the demand of water being increasing in Bengaluru, supply of water to factories and Thermal Power Units. In this backdrop, above, a State Level Committee under the Chairmanship of Secretary to Government, Urban Development Department has been constituted vide Government order read at (1) for preparing a policy for Urban areas Waste Water reuse and recommend the

MD

Managing Director's Office  
KUWS&D Board, B'lore  
(For Necessary Action)  
CE (D&M) PS/PA  
9/11/18

10/2018  
CE - BNG  
CE - DWG  
CE - KOL  
CE - HYS

Government. As per the recommendation of the said Committee, the Government has decided to execute the policy and ordered as follows: -

**GOVERNMENT ORDER NO: UDD 435 PRJ 2014,**  
**BANGALORE, Date: 27-12-2017**

In the circumstances as explained in the preamble the Government of Karnataka pleased to accord approval for the urban waste water reuse policy as detailed in the annexure to this order.

**1. Implementation of Policy:**

A Management Committee has been constituted as follows for implementing the urban waste water reuse policy.

1	Secretary, UDD	[Chair]
2	Commissioner, Industries	Member
3	Managing Director, KUWSDB	Member
4	Engineer-in-Chief, BWSSB	Member
5	Managing Director, KUIDFC	Member
6	Commissioner Agriculture, Department of Agriculture	Member
7	Director, Directorate of Municipal Administration	[Convener]
8	Other stakeholders	as needed

**The role/responsibilities of the Management Committee:-**

1. Provide strategic and operational guidance for the setting up of the Wastewater Resource Centre within the Urban Development Department.
2. Advise on the prioritization and selection of cities/towns for wastewater reuse.
3. Advise on incentives, implementation mechanisms and financing options for waste water reuse projects.
4. Advise and guide various implementation agencies, including but not limited to, BWWSB, KUWSDB, KIADB, KUIDFC etc., to support the focused development of wastewater reuse projects in the State.
5. Facilitate cross-departmental alignment between various government departments including Departments of Industries and Commerce (KIADB, KSIIDC etc), Urban Development (BWSSB, KUWSDB, KUIDFC etc), Water Resources, Agriculture, Energy, Finance etc.

2. Urban Water Work Stream—Working Group is constituted with following constitution the below union in order to give suggestions to the Government in connection with Urban Waste Water Reuse.

Government	Industry	Civil Society/ Academia
<ul style="list-style-type: none"> <li>• Additional Chief Secretary, Urban Development Department (Chair)</li> <li>• Additional Chief Secretary, Commerce and Industries</li> <li>• Representative, Karnataka State Pollution Control Board</li> <li>• Managing Director, KUIDFC</li> <li>• Chairman, Bangalore Water Supply and Sewerage Board (Member Secretary/ Convener)</li> </ul>	<ul style="list-style-type: none"> <li>• Head, Jindal Power Plant, Bellary</li> <li>• Representative, Toyota Kirloskar Motors</li> <li>• Representative, H&amp;M Textiles</li> <li>• Representative, FKCCI/ CII</li> </ul>	<ul style="list-style-type: none"> <li>• Representative, Arghyam</li> <li>• Representative, Biome</li> <li>• Representative, IISC</li> <li>• Representative, Civil Society Organization/ Academia</li> </ul>

**Duties of above said Urban Water Work Stream Working Group:**

1. Multi-stakeholder guidance to Waste Water Reuse projects with the aim of accelerating implementation
2. Facilitation of institutional mechanisms and support for guidelines for structuring and implementation of waste water reuse projects;
3. Advisory role in formulation of concept notes for related urban water topics.

**3. Waste Water Reuse Resource Centre:**

Approval has been accorded to constitute the waste water reuse resource centre so as to implement the waste water reuse policy of Urban Local Bodies of the State.

Waste Water Reuse Resource Centre..would..be..constituted as information Centre at State Level, suggestion Centre and so as to implement the project. The Management Committee under the chairmanship of the Secretary, Urban Development Department shall decide the structure, functions and staff of the Resource Centre initial expenditure of Rs.53.00 lakhs has been estimated as below for

establishment of Waste Water Reuse Resource Centre. At the beginning, 13 cities shall be selected for waste water reuse project. The said expenditure shall be balanced with the grant which would be sanctioned to the Urban Development Department. The additional expenditure for implementing the waste water reuse in more cities shall be met out from the Urban Local Bodies and Urban Development Department, KUWS & DB, Bangalore Water Board, KIADB.

Explanation (4 months)	Rs. In lakhs
Human Resource	44.6
Survey/Examination/Preparation of document	2.00
Workshop and Training	2.40
Establishing Office	2.00
Miscellaneous	2.00
Total	53.00

This order has been issued as per the approval of the Cabinet caseNo.C/806/2017, dated:11.12.2017.

By order and in the name of the  
Governor of Karnataka,

  
(Lalitha Bai. K)

Under Secretary to Government,  
Urban Development Department.

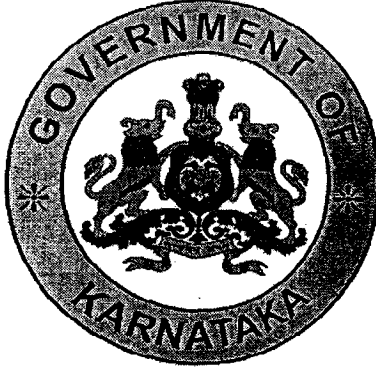
To,

The Compiler, Karnataka Gazette, Bengaluru – for publishing in the next Gazette.

1. The Accountant General, Karnataka, Bengaluru.
2. The Additional Chief Secretary to Government, Urban Development Department, Bengaluru.
3. The Additional Chief Secretary to Government, Department of Commerce and Industry.
4. The Additional Chief Secretary to Government, Department of Forest, Ecology and Environment.
5. The Principal Secretary to Government, Planning Department, Bengaluru.
6. The Principal Secretary to Government, Finance Department, Bengaluru.
7. The Principal Secretary to Government to Hon'ble Chief Minister, VidhanaSoudha, Bengaluru.
8. The Secretary to Government, Urban Development Department, Bengaluru.
9. The Chairman, Bangalore Water Board.
10. The Managing Director, KUIDFC, Bengaluru.

11. The Commissioner, Industries.
12. The Commissioner, Agriculture Department.
13. The Managing Director, Karnataka Urban Water Sewage and Drainage Board, Bengaluru.
14. The Director, Directorate of Municipal Administrative, V.V. Tower, Bengaluru.
15. The Chief Engineer, Bengaluru Water Supply Sewerage Board.
16. The Deputy Commissioner, office of the Deputy Commissioner.
17. The Deputy Secretary (Cabinet Section) VidhanaSoudha, Bengaluru.
18. The Private Secretary to Hon'ble Minister for Urban Development, Bengaluru.
19. The Private Secretary to Hon'ble Minister for Municipal Administration.
20. All the Project Directors, District Urban Development Cell, Office of the Deputy Secretary.
21. All Commissioners/Municipal Commissioners/Chief Officers, Mahanagara Palike/City Municipal Council/Town Municipal Council/Town Panchayath – through Directorate of Municipal Administration.
22. Representative of Karnataka State Environment Pollution Control Board. BW
23. Head, Jindal Power Plant.
24. Representative of Arghyam.
25. Representative of Toyota Kirloskar Motors.
26. Representative of Biome.
27. Representative of H and M Textiles.
28. Representative of IISC.
29. Representative of FKCCI/CII.
30. Representative of Public and Academic sector
31. Bastiaan Mohrmann, Co-Lead, Asia and Middle East, 2030 Water Resources Group, bmohrmann@ifc.org.
32. Section Guard file/Spare copy.

Through  
BWSSB



**Urban Development Department**

**Policy for Urban Waste Water Reuse**

**Enabling Environment for Urban Wastewater Reuse**

**Government of Karnataka**

**December 2017**

# Urban Waste Water Reuse Policy

## Table of Contents

Sl No	Particulars	Page No.
1	I. Background and Context	2
2	II. Vision	3
3	III. Key Policy Issues	3
4	IV. Alignment with International/ National Policies and Frameworks	4
5	V. Coverage	4
6	VI. Policy goals	5
7	VII. Implementation Support for Wastewater Reuse Opportunities	7
8	VIII. Roles and Responsibilities	9
9	Annex 1: Wastewater Reuse Categories	11
10	Annex 2: List of Class 1 and Class 2 Cities, and AMRUT Cities in Karnataka	13

# Government of Karnataka

## Enabling Environment for Urban Wastewater Reuse

### Key Aspects

- Government of Karnataka seeks to position the state as a national leader in the sphere of integrated urban water resource management, and circular economy with respect to water and wastewater. Urban wastewater treatment and reuse, guided by this policy, is a central aspect thereunder.
- The overall goal of this policy is to establish an enabling environment for the reuse of municipal wastewater to maximize efficient resource use, protect the environment, address water scarcity, and enhance economic output. It aligns with international and national guidance on the same.
- This policy covers all Class I and Class II urban centres in Karnataka. It targets for at least 10 major cities/towns to adopt wastewater reuse principles with concrete implementation plans by 2020, starting with AMRUT cities; and to augment the initiative to all major cities/towns by 2030.
- The policy adopts water quality standards for various categories of re-use which are in alignment with national, state and other relevant guidance on the same.
- For each urban centre in the state, the allocation of secondary treated wastewater among categories of users viz., industry, agriculture, urban etc. will be based on the principles of (a): equity and fairness. (b): sustainability of operations of the wastewater treatment plant.
- To promote a shift in industrial water use from freshwater to treated wastewater, it is proposed that industrial estates/ zones within [30 km] of a sewage treatment plant (STP) mandatorily examine, as a first option, available secondary treated wastewater (STW) from the STP, with regard to reliability of supply, quality and pricing. Only if off-take of such STW is shown to be non-viable, will alternate sources of water for use by industry be examined.
- Where demand for off-take is significant, or approximates availability of secondary treated wastewater generated, urban centres will seek to establish operational cost recovery of networks and sewage treatment plants, by balancing allocation and tariff for wastewater among various user categories.
- With the aim of achieving the policy goals, Government of Karnataka is committed to establishing a municipal wastewater reuse "Resource Center" at the state level, to act as an information and implementation facilitation cell.

### I. Background and Context

Urban waste water (or sewage) is understood as water carrying waste, comprising both grey water (water used for washing) and black water (water used in toilets that is combined with human waste). While this policy focuses on the reuse of treated waste water and the associated implications on sustainable sanitation and water resource availability, it is recognised that an integrated approach to urban water management – one incorporating all streams of water in urban areas with a view to optimising use and management – would necessarily consider other elements of the water loop, i.e., the management of water supply; as well as of surface run-off.

As per Census 2011, 38.7 percent, i.e., 23.6 million population or 5.16 million households in Karnataka live in urban areas. Projections indicate that the urban population will grow to more than 36 million by 2030. Of these, nearly 19 million currently live in Class I and Class II cities, with



populations above 50,000<sup>1</sup> (Census 2011). Adopting conservative levels of water supply<sup>2</sup>, the current generation of waste water in Class I and Class II cities of the state is estimated at approx. 1215 MLD. The waste water treatment capacity developed in the state so far is not adequate to treat the total volume of waste water generated in these two classes of urban centres. Moreover, existing urban wastewater treatment plants in the country are also not utilised at full capacity, and, on average, operate at 72% utilisation (CPCB 2009a). Consequently, it is estimated that more than 75% of the waste water generated in Class I and Class II urban centres (nation-wide) is discharged on land or in various water bodies without any treatment<sup>3</sup>, resulting in large scale environmental pollution and posing significant public health hazard.

Capture, treatment and reuse of municipal waste water presents an opportunity for environmental rehabilitation, as well as for meeting the water requirements of different categories of users:

#### 1. Hydrological and Economic Rationale for Wastewater Reuse:

The urban water demand-supply gap in Karnataka is estimated to increase from 24% in 2011 to 58% in 2030<sup>4</sup>. This stems from climate change factors as well as rising urban water demand on account of an increase in the urban population. The total annual demand for water for the industrial sector is estimated to increase more than three times, from 26 TMC in 2011 to 85 TMC by 2030, resulting in a 69% water demand-supply gap by 2030. Closing this demand-supply gap through primary supply augmentation measures presents major financial and physical issues, while the reuse of secondary treated wastewater (STW) offers a cost-effective and feasible solution.

#### 2. Benefits of Secondary Treated Water (STW) Reuse:

The reuse of STW offers the following benefits:

- **Decreased risks to human health and the environment** by reducing the release of untreated wastewater to the environment
- **Reliability of supply for agricultural and industrial use** to enhance economic output and employment opportunities, particularly as a coping strategy in view of climate change variability and associated water supply risks
- **Reduced energy consumption** associated with production, treatment and distribution of freshwater
- **Improvement in the financial sustainability of Urban Local Bodies ("ULBs")** through improved recovery of the costs of wastewater treatment and supply, particularly to industry
- **High nutrient content in wastewater**, providing benefits for agricultural production

## II. Vision

Accelerated adoption of circular economy across the major towns and cities of Karnataka with respect to wastewater treatment and reuse, with following targets:

- By 2020, [10 major cities<sup>5</sup>] have adopted wastewater reuse principles and developed firm plans, to be increased to [100% of all major cities/towns] by 2030
- By 2020, 20% of all STW is targeted for reuse across the state, in accordance with regulatory standards; [to be increased to [50%] by 2030], subject to responsible ecological return flow provisions approved under Integrated Urban Water Management Plans<sup>6</sup>

<sup>1</sup>At which scale network sewerage systems and Sewage Treatment Plants (STPs) may be considered as feasible options IWMI & WSP, 2016)

<sup>2</sup>80 litres per capita per day (lpcd)

<sup>3</sup>International Water Management Institute (IWMI) and Water and Sanitation Program (WSP) (2016), Recycle and Reuse of Treated Wastewater in Urban India: A Proposed Advisory and Guidance Document.

<sup>4</sup>2030 WRG (2014), Creating a Sustainable Water Future for Karnataka – Urban and Industrial Sectors

<sup>5</sup>Class I and II cities, corresponding presently to 67 cities and towns in Karnataka (Refer Annex 2)

### III. Key Policy Issues

In order to achieve the above vision, the following key policy constraints must be addressed:

- **Lack of an integrated approach to urban water resource management:** Water and wastewater initiatives are currently planned in a piecemeal manner, with little consideration of efficient resource use in the full water loop; or circular economy principles
- **Poor awareness:** Safe capture, treatment and disposal of wastewater has been accorded low priority, and there is poor awareness, even among key stakeholders, of linkages with public health. As a result, there is insufficient focus on ensuring adequate coverage of network sewerage, and connections to the same; or on decentralised options, where network sewerage may not be viable; and on the health implications of the use of untreated wastewater in agriculture
- **Viability of urban wastewater treatment facilities:** Revenues from sanitation services in urban centres and/or fiscal transfers for the same are inadequate to ensure operation and maintenance of wastewater treatment plants to required standards. Consequentially, secondary treated wastewater often does not meet regulatory standards, and is unfit for reuse
- **Lack of clear guidelines and framework:** While wastewater reuse finds mention in several policies and programs, there is an absence of a clear framework to support implementation of projects in a manner that aligns stakeholder interests and priorities, and is operationally sustainable
- **Institutional coordination:** Water plays a significant role in several sectors, including urban, agriculture, industries and power. There is a need for a platform for interaction and coordination among sectoral departments and other concerned stakeholders to facilitate greater synergies and collaboration towards efficient resource use.

---

<sup>6</sup>This provision accounts for the hydrological principle of return flows, whereby users of treated wastewater are themselves new generators of wastewater; and whereby net withdrawal of the urban hydrological cycle is limited to evapo-transpiration, embedded water in products, and/or lost return flows.

## IV. Alignment with International/ National Policies and Frameworks

The concept of waste water re-use, and the need to include the same in water supply management programs is recognised by most policy and guidance documents in India. Specifically, this policy aligns with the following national and international agenda:

1. **UN Sustainable Development Goals:** The Sustainable Development Goals ("SDGs") are focused, among other areas, on environmental protection and prosperity creation. In particular, the policy aligns with the following SDGs: SDG 3: Good Health and Well-Being; SDG 6: Clean Water and Sanitation; SDG 8: Decent Work and Economic Growth; SDG 11: Sustainable Cities and Communities.
2. **National Water Policy 2012:** The National Water Policy 2012 promotes and incentivizes the reuse of wastewater, including through Section 6.3: 'Recycling and reuse of water, including return flows, should be the general norm'; Section 7.3: 'Recycling and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system'; and Section 11.7: 'Subsidies and incentives should be implemented to encourage ... and recycling / reuse, which are otherwise capital intensive.
3. **National Service Level Benchmarks; National Urban Sanitation Policy (NUSP):** The National Service Level Benchmarks, instituted by the Ministry of Urban Development, Government of India, establish a 20% target for reuse of urban wastewater generated.
4. **Power Tariff Policy (revised, 2016):** The revised power tariff policy mandates thermal power plants within 50 kms of a city STP to off-take all the treated wastewater from the STP. Charges incurred in conveyance of wastewater from the STP to the power plant are eligible for pass through in the power tariff.
5. **AMRUT:** This policy will align with the Government of India's AMRUT scheme, for implementation of wastewater reuse infrastructure solutions in selected towns and cities (refer Annex 2).
6. **Karnataka State Water Resources Policy:** The policy envisages formulation of city-level integrated water management plans incorporating wastewater re-use and recycle in alignment with the Karnataka State Water Resources Policy 2012, including priority allocations across different sectors.
7. **Government Order for Promoting Wastewater Reuse in Bangalore:** Government Order No: FEE 188 ENV 2003, Bangalore dated 14-08-2003, mandates the use of tertiary treated water for non-potable purposes, including gardening; washing, servicing and cleaning of vehicles; and civil construction activities; and roads and bridges in Bangalore city.
8. **KSPCB Order for Promoting Wastewater Reuse in Urban Local Bodies:** KSPCB Order No. PCB/074/STP/2012/4975 dated 5<sup>th</sup> December 2015, stipulates that secondary treated sewage mandatorily be sold for use for non-potable purposes such as industrial use, railways, bus cleaning, flushing of toilets with dual piping, horticulture and irrigation; and no potable water be allowed for such activities.

## V. Coverage

This policy covers all Class I and Class II urban centers in Karnataka (as listed in Annex 2), and focuses largely on recycling afterwastewater conveyance through sewer networks and treatment at sewage treatment plants. Separate guidance may be developed for smaller cities and towns that may have alternate wastewater conveyance and treatment systems in place, for eg., systems for faecal sludge management.

## VI. Policy Goals

The overall goal of this policy is to establish an enabling environment for the reuse of municipal wastewater to maximize efficient resource use, protect the environment, address water scarcity, and enhance economic output.

Reuse is envisaged under the following broad categories, with associated quality standards (refer Annex 1): (a): agriculture (b): industry (c): urban non-potable, including residential, commercial and institutional (d): environment and (e): energy and nutrient recovery

The Government of Karnataka seeks to be a pioneer regionally in sustainable water resources management in the urban and peri-urban context. Towards this, the specific measures proposed to achieve the policy goals are:

### **Integrated Urban Water Resource Management**

Adopting an integrated approach to water resources in cities, including wastewater, through mainstreaming thinking, planning and implementing measures related to urban water resources in all relevant sectors and departmental domains as a cross cutting issue, and particularly in all urban management endeavours. This would include strengthening state, city and local institutions to take up the approach in planning, implementation and O&M including through partnerships with private sector and community. It is proposed that at least 10 major cities/towns have adopted integrated water resource management plans, developed as multi-sectoral initiatives and incorporating wastewater reuse principles and implementation plans therein, by 2020; and that the initiative be augmented to include all major cities/towns by 2030.

The integrated approach shall account for the hydrological principle of return flows, whereby users of STW are themselves new generators of wastewater, and whereby net withdrawal of the urban hydrological cycle is limited to evapo-transpiration, embedded water in products, and/or lost return flows.

### **Overall Urban Wastewater Generated**

Reuse of not less than 20% STW is targeted, as a combined average across sectors, of total urban wastewater generated for identified Karnataka urban centers by 2020, aligning with the national Service Level Benchmark and with the AMRUT program. For the purposes of this document, agricultural, industrial and urban non-potable uses will be considered to contribute to the reuse target. However, discharge of treated wastewater into water bodies will not be part of the target. Subject to responsible ecological return flow provisions approved under Integrated Urban Water Management Plans, the reuse target shall be increased progressively.

### **Water Consumption by Industry**

In addition, in order to promote a shift in industrial water use from freshwater to treated wastewater, this policy proposes that industrial estates/ zones within [30 km] of a sewage treatment plant (STP) mandatorily examine, as a first option, available STW from the STP, provided that STW of the required quality is made reliably available at a cost to consumer that is comparable to the applicable tariff for provision of fresh water for industrial use in the region. Only if off-take of such STW is shown to be non-viable, will alternate sources of water for use by industry be examined. The Department of Industries and Commerce may set a voluntary target for use of STW to comprise (indicatively) 20% of the total state-wide industrial water use, including energy sector, by 2020. This goal shall be aligned with the volume of STW available for industry as per the integrated urban water management plans of the first (AMRUT) cities targeted under this Policy by 2020.

## Treatment of Urban Wastewater

Cities will strive to progress towards greater capture and treatment of wastewater generated through centralised and decentralised options, with treatment increasingly linked to reuse. With the aim of reducing loads at centralised wastewater treatment facilities, the following decentralised treatment and re-use practices are encouraged, and may be appropriately incentivised:

- For large generators (e.g., residential complexes, hotels...etc.), on-site treatment for localised re-use
- En-route off-take (including at plant gate, prior to treatment) of untreated waste water, at the applicable tariff, for further local treatment and re-use (e.g.: for urban environmental purposes, industry, other uses)

In this context, this policy specifically seeks to acknowledge and encourage the practice of localised treatment of wastewater through constructed wetlands for the express purposes of rejuvenation of urban and peri-urban water bodies, as is currently being practiced in Bangalore city (e.g.: Jakkur lake, Allalassandra lake, Puttenhalli lake, and several others)

## Allocation of Secondary Treated Wastewater

For each urban centre, the allocation of secondary treated wastewater among categories of users viz., industry, agriculture, urban...etc. will be based on the principles of

(a): Equity and Fairness, aimed at ensuring access to different user groups, as per need and context

(b): Sustainability, targeting to minimise subsidies required to operate and maintain networks and the wastewater treatment plant to meet regulatory standards for STW quality

## Pricing of Wastewater and Operational Cost Recovery of Wastewater Treatment Plants

In accordance with the Generator Pays Principle, cities have been levying charges for wastewater services on generators as a percentage of water consumption charges<sup>7</sup>. This is envisaged to remain a primary source of revenue for the operation of wastewater systems, including networks, alternate collection systems (if any) and sewage treatment plants; and will be sought to be strengthened through metering, volumetric charges for water consumption, and other means.

However, revenue from the sale of STW can, to a significant extent<sup>8</sup>, contribute to operational costs of wastewater systems. Where adequate demand exists for off-take of the STW generated, urban centres will seek to maximize operational cost recovery of networks and secondary treatment plants, by balancing allocation and tariff for wastewater among various user categories duly considering the following:

- The tariff proposed (in Rs/KL) is applicable at the plant gate, or at in-city locations en-route of the sewerage network<sup>9</sup>. The off-taker is responsible for meeting additional cost of conveyance to a specified location
- The tariff proposed for any user category is comparable to the applicable tariff for provision of freshwater (municipal, industrial or other water supply; excluding agriculture) to the same category
- The principle of cross-subsidy is applied, as required

Where off-take for industrial reuse requires tertiary treatment of a specific volume of STW to be undertaken by the city, operational costs for the same – including disposal of process rejects – shall be recovered from industry through additional charges. Hence tertiary treatment plants are to be established by urban centres only after establishing (conditions for)

<sup>7</sup>For eg., in the case of Bangalore, a fee of 25% of the water charge is raised towards sanitation services. Additionally, properties with borewells are also charged a separate fee for sanitation

<sup>8</sup>In some cases, revenue from sale of STW is adequate to cover the operational costs of STPs

<sup>9</sup>In case of off-take of untreated wastewater, for further treatment by the user

reliable demand /off-take for the entire volume of water so treated to pre-agreed quality standards.

Where off-take of either untreated sewage or STW for agricultural use has been prevalent, consideration shall be made to ensure that the demand is met in accordance with the principles for allocation and pricing outlined above; and without unduly compromising operational sustainability of the network and wastewater treatment plant; while ensuring that the reuse wastewater complies with the applicable regulatory standards for quality.

## VII. Implementation Support for Wastewater Reuse Opportunities

With the aim of achieving the policy goals and systematically identifying wastewater reuse opportunities in cities, Government of Karnataka will support:

### 1. Development of Integrated Urban Water Resources Management Plans

Each ULB will be supported in developing an Integrated Urban Water Resources Management Plan through a consultative process by:

- i. Identifying demand for untreated<sup>10</sup> and secondary treated wastewater by agricultural, industrial and other users, including:
  - Largest potential users of STW, in order to maximize possible revenue streams from the sale of STW
- ii. Ensuring supply of a sufficient volume of secondary treated wastewater for distribution
- iii. Identifying local water resources availability and requirement for environmental flows, along the hydrological principle of return flows outlined above

The ULBs will explore Public Private Partnerships (PPPs) as a possible option for implementation of wastewater reuse projects, focussing on bringing in private sector expertise for sustainable operations and maintenance of wastewater assets, with balanced risk allocation, and performance-based remuneration.

### 2. Establishment of a Wastewater Reuse Resource Center

A global best practice Wastewater Reuse "Resource Center" will be established at state level to act as an information and transaction facilitation cell, aimed at:

- i. **Awareness and Capacity Building:** Building awareness, disseminating information, and augmenting capacity of: (a) ULBs; and (b) potential offtakers of treated wastewater, in the following areas:
  - a. Business/ environmental case for wastewater reuse
  - b. Models for project development and execution, including arrangements for sustainable operations and maintenance (incl. public private partnerships), and performance-based contracting
  - c. Cost-effective options for sewage collection, treatment and reuse, including decentralized solutions
- ii. **Project Assistance:** Assisting ULBs and potential wastewater reuse customers with the following:
  - a. Preparing first-level Integrated Urban Water Resources Management plans
  - b. Identifying viable wastewater reuse projects, with a particular focus on AMRUT cities, aligning with AMRUT investment programs and capacity building goals, where appropriate, in the preliminary phase
  - c. Supporting project structuring and financial/ economic analysis, including pre-feasibility assessments

<sup>10</sup> Subject to further treatment by the user, to meet applicable regulatory standards, prior to re-use

- d. Facilitating outreach and engagement with off-takers, including coordination and collaboration with Department of Industries and Commerce (DIC) and Karnataka Industrial Areas Development Board (KIADB) for industrial offtake; and Department of Energy for off-take from thermal power plants
- e. Facilitating transaction support through the recruitment of transaction advisors
- f. Supporting cities in intariff setting for supply of secondary treated wastewater in line with principles outlined in Section VI above
- g. Monitoring the implementation of wastewater reuse projects

The Resource Center will support the development of projects, with the aim of ensuring that relevant quality parameters for each reuse category are met, rather than prescribing wastewater technologies. This would encourage the development of innovative, cost-effective, and context-specific solutions for wastewater treatment and reuse.

The Resource Center will establish connections with global partners to reinforce and accelerate the transfer of best practices and shared learning from implementation of wastewater reuse initiatives globally. As part of this, it will keep updated on developments in thinking and practice, including with regard to online tools by leading organisations for water (stress) management.

### 3. Performance Monitoring

Karnataka State Pollution Control Board (KSPCB) will be responsible for monitoring secondary treated wastewater quality from treatment plants, including decentralised units, to ensure compliance with quality standards required for different reuse categories.

### 4. Financing of Wastewater Reuse Projects

Wastewater reuse projects will be aligned to the AMRUT / alternate Government of India program, where appropriate, including drawing upon available AMRUT / other Government of India funding, coordinated by the Directorate of Municipal Administration (DMA).

For individual wastewater reuse projects, financing of implementation will include a combination of:

- Revenues from the sale of secondary treated wastewater, particularly in the case of industrial (including power sector) offtake
- Funding from Government of Karnataka (including DMA under the AMRUT program/ state budget/Urban Development Department budget / ULB budget),
- Capital investments by industry (including power sector) for part of the estimated costs, where feasible

Funding of pre-feasibility and feasibility assessments will be made available from Urban Development Department budgets, including from ULBs and KUWSDB.

## VIII. Roles and Responsibilities

### A: Government of Karnataka: Primary Departments

1. Urban Development Department, through Directorate of Municipal Administration; Karnataka Urban Water Supply and Drainage Board ("KUWSD&B"); Karnataka Urban Infrastructure Development and Finance Corporation ("KUIDFC"); and Bangalore Water Supply and Sewerage Board ("BWSSB")

In addition to the implementation support outlined in Section VII above, the Urban Development Department will undertake

- Establishment of the overall enabling environment, including supportive policies, capacity building, financing, IEC and awareness raising, information dissemination, market development...etc. for wastewater reuse projects and investments
- Establishment of a body to oversee and monitor the performance of wastewater reuse projects, including the performance of concessionaires in PPP projects; and constitute a dispute resolution mechanism for the same
- Budget and resource allocation to operationalise Wastewater Reuse Resource Center, including procurement of expertise for pre-feasibility assessments and project development support; coordination and oversight of inputs
- Identification of wastewater reuse opportunities
- Active partnerships with all relevant departments to mainstream an integrated urban water resources management approach in planning and implementation; and implement cross sector STW reuse initiatives

2. Department of Industries and Commerce, through Karnataka Industrial Areas Development Board

- Establishment of a voluntary target for treated wastewater to comprise 20% of the total state-wide industrial water use by 2020
- Coordination and outreach to industries to facilitate secondary treated wastewater reuse, particularly in industrial zones and clusters

3. Department of Energy

- In compliance with the Government of India's recently revised Power Tariff Policy (2016), coordinate partnerships of thermal power plants with urban centres within 50 km radius for off-take of all STW available; and facilitate operational sustainability of wastewater treatment plants

4. Department of Forest, Ecology and Environment, through Karnataka Pollution Control Board

- Establishment of and monitoring of compliance to standards and regulations on wastewater quality norms for various reuse categories

Secondary Departments

1. Water Resources Department

- Overall water resources allocation and prioritization
- Alignment and consistency with irrigation policies and practices, including Minor Irrigation, for reuse of wastewater by agriculture

2. Department of Agriculture

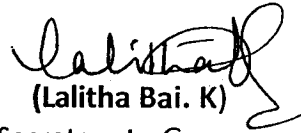
- Monitoring of irrigation practices and use of (untreated) wastewater for food production
- Sensitising farmers to adverse health impacts of use of untreated wastewater

**B: Urban Local Bodies**

- Preparation of Integrated Urban Water Resources Management Plans, including consultations with stakeholder groups for STW demand assessment;



- Ensuring supply of a sufficient volume of secondary treated wastewater for off-take, including through adequate coverage of sewerage network sustained and Information, Education and Communication (IEC) programs to promote connections to the network
- Outreach to Wastewater Reuse Resource Center for support in project identification, structuring and pre-feasibility assessments
- Provision of funding for project feasibility assessments



(Lalitha Bai. K)  
Under Secretary to Government,  
Urban Development Department.

## Annex 1

### Wastewater Reuse Categories:

Municipal wastewater may be used for the following broad purposes, with associated quality standards:

- **Agriculture**
  - **Rationale:** Use of wastewater for nutrient content, in order to increase food production and ensure food security, along with reduced fertilizer use/ costs, to supply growing urban and peri-urban populations
  - **Relevant Standard:** As specified in "Manual on Sewerage and Sewage Treatment Systems", Central Public Health Engineering and Environment Organisation (CPHEEO), Ministry of Urban Development, Govt. of India, 2013.

#### *Suggested Minimum Water Quality Criteria for Agricultural Reuse*

Parameter	Unit	Value
Intestinal nematodes	No./liter	< 1
Faecal coliforms	MPN/100 ml	Nil (for crop eaten raw) & <230/100 ml (for crops eaten cooked or non-edible crops)
pH		6 – 9

*Source: Chapter 7, Part A of the CPHEEO 2013 Manual on Sewerage and Sewage Treatment*

- **Industry:**
  - **Rationale:** Use of wastewater in production processes and/ or for secondary applications within industrial facilities
  - **Relevant Standard:** as per industrial reuse requirements

#### *Typical Water Quality Requirements for Industrial Reuse*

Constituent (mg/L)	Industrial Application				
	Boiler Feed	Pulp and Paper	Textiles	Petroleum and Coal	Cooling Water <sup>11</sup>
Calcium	0.01 – 0.4	20	-	75	100
Iron	0.05 – 1.0	0.3 – 1.0	0.1 – 0.3	1	-
Manganese	0.01 – 0.3	0.05 – 0.5	0.01 – 0.05	-	-
Alkalinity as CaCO <sub>3</sub>	40 – 350	100	-	125	-
Chloride	-	200 – 1000	-	300	100
TDS	200 – 700	-	100	1000	-
Hardness as CaCO <sub>3</sub>	0.07 – 350	100	25	350	-
Ammonium - N	0.1	-	-	-	1- 3
Phosphate - P	-	-	-	-	0.6
Silica	0.7 – 30	50	-	-	20
Color (Hazen)	-	10 – 30	5	-	-

*Source: Guidance Note for Municipal Wastewater Reuse and Reclamation in India, JICA*

- **Urban non-potable uses, such as residential, commercial, or institutional use**
  - **Rationale:** Associated reduction in freshwater use
  - **Relevant Standard:** Karnataka State Pollution Control Board standards, depending on type of reuse

<sup>11</sup>2013 CPHEEO Manual (Part A Chapter 7) discusses cooling tower water and boiler water in some detail

- **Environment**

- **Rationale:** Discharge of treated wastewater to support wetlands, and supplement water bodies, streams and rivers to increase environmental flows
- **Relevant Standard:** Karnataka State Pollution Control Board standards for discharge into rivers and water bodies; or as specified in CPHEEO 2013

*Suggested Minimum Water Quality Criteria for Environmental/ Recreational Reuse*

Parameter	Unit	Value
BOD5		≤ 10
TSS	mg/L	<5
Faecal coliforms	MPN/100 ml	Nil
pH		6.5 – 8.3
Total Kjeldahl Nitrogen (as N)	mg/L	< 5 for impoundments, < 10 for Horticulture/Golf Course
Dissolved Phosphorus (as P)	mg/L	1
Colour (Hazen)		Non Detect

*Source: Chapter 7, Part A of the CPHEEO 2013 Manual on Sewerage and Sewage Treatment*

- **Energy and nutrient recovery**

- **Rationale:** Development of circular economy solutions, including business case for energy and nutrient recovery
- **Relevant Standard:** According to global benchmarks of potential energy and nutrient recovery



(Lalitha Bai. K)

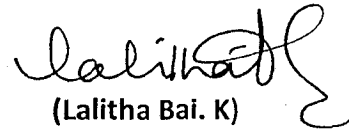
Under Secretary to Government,  
Urban Development Department.

## Annex 2

**List of Class 1 and Class 2 Cities, and AMRUT Cities in Karnataka**

S. No.	Name	Status	Population	AMRUT City
1	Arsikere	TownOG	53,216	
2	Bāgalkot	City	1,11,933	Yes
3	Bail Hongal	Town	49,182	
4	Basavakalyān	City	69,717	
5	Belgaum	Aggl	6,10,350	Yes
6	Bellary	City	4,10,445	Yes
7	Bengaluru	Aggl	85,20,435	Yes
8	Bhadravati	City	1,51,102	Yes
9	Bhatkal	Aggl	49,730	
10	Bidar	CityOG	2,16,020	Yes
11	Biapur	City	3,27,427	Yes
12	Challakere	Town	55,194	
13	Chamarajanagar	City	69,875	
14	Channapatna	City	71,942	
15	Chikkaballapura	City	63,652	
16	Chigmagalur	City	1,18,401	Yes
17	Chintāmani	City	76,068	
18	Chitradurga	CityOG	1,45,853	Yes
19	Dandeli	City	52,069	
20	Dāvanagere	City	4,34,971	Yes
21	Dod Ballāpur	CityOG	93,105	
22	Gadag-Betigeri	City	1,72,612	Yes
23	Gangāwati	CityOG	1,14,642	Yes
24	Gokāk	City	79,121	
25	Gulbarga	CityOG	5,43,147	Yes
26	Harihar	Aggl	90,502	
27	Hassan	Aggl	1,73,008	Yes
28	Hāveri	City	67,102	
29	Hiriyūr	Town	56,416	
30	Hoskote	Town	56,980	
31	Hospet	City	2,06,167	Yes
32	Hubli Dharwad	City	9,43,788	Yes
33	Hunsūr	Town	50,865	
34	Ilkal	City	60,242	
35	Jamkhandi	City	68,938	
36	Kanakapura	Town	54,014	
37	Karwar	CityOG	77,139	
38	Kolar	City	1,38,462	Yes
39	Kollegal	City	57,149	
40	Koppal	City	70,698	
41	Mandya	City	1,37,358	Yes
42	Mangalore	Aggl	6,23,841	Yes
43	Mudhol	Town	52,199	

44	Mulbāgal	Town	57,276	
45	Mysore	Aggl	9,90,900	Yes
46	Nanjangūd	Town	50,598	
47	Nipāni	City	62,865	
48	Puttūr	Town	53,061	
49	Rabkavi Banhatti	City	77,004	
50	Rāichūr	City	2,34,073	Yes
51	Rāmanagara	City	95,167	
52	Ranībennur	City	1,06,406	Yes
53	Robertson Pet	CityOG	1,62,230	Yes
54	Sāgar	City	54,550	
55	Shāhābād	Aggl	61,262	
56	Shāhpur	Town	53,366	
57	Shimoga	City	3,22,650	Yes
58	Shorāpur	Town	51,398	
59	Sidlaghatta	Town	51,159	
60	Sindhūr	City	75,837	
61	Sīra	City	57,554	
62	Sīrsi	City	62,882	
63	Siruguppa	Town	52,492	
64	Tiptūr	City	59,543	
65	Tumkūr	City	3,02,143	
66	Udupi (Udipi)	Aggl	1,65,401	Yes
67	Yādgīr	City	74,294	



(Lalitha Bai. K)

Under Secretary to Government,  
Urban Development Department.