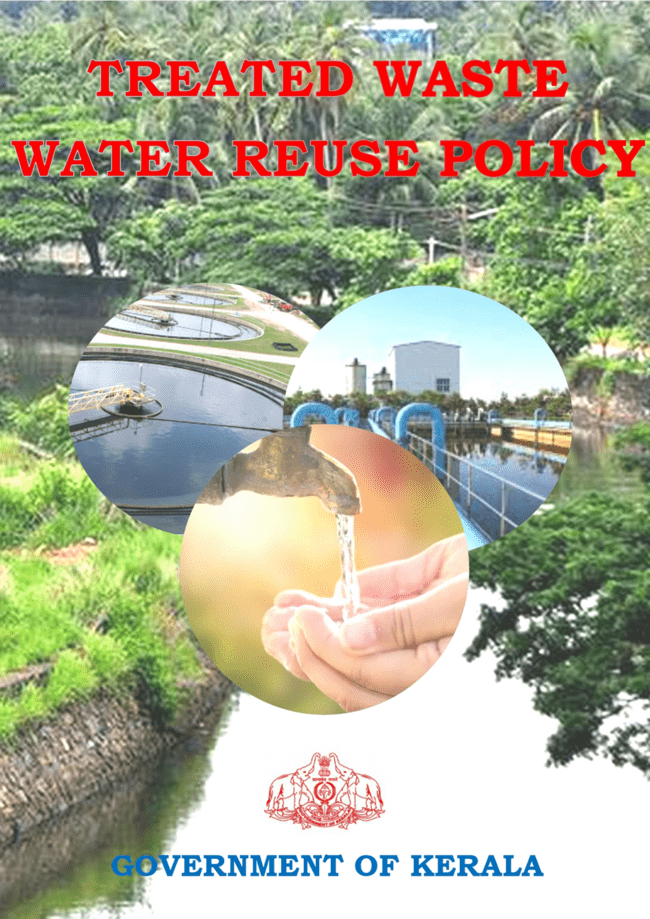
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**POLICY FOR SAFE REUSE OF TREATED WASTEWATER, KERALA**

**(DRAFT)**

**Members**

1. **Sri. U. V. Jose, IAS (Retd.), Executive Director, Suchitwa Mission**
2. **Sri. Suraj Shaji IAS, Mission Director, AMRUT**
3. **Sri. S. Subramanian IIS, Managing Director, IMPACT Kerala**
4. **Smt. Jyothi K. I., Joint Director (Farm), Agricultural Department**
5. **Sri. Praveen. K. S., Deputy Chief Engineer, Kerala Water Authority**
6. **Sri. Krishnan M. N., Senior Environmental Engineer, Kerala State Pollution Control Board**
7. **Sri. A. G. Gopakumar, Superintending Hydrogeologist, Ground Water Department**

**Foreword**

As we stand at the precipice of environmental challenges, the need for innovative solutions to ensure water security has never been more pressing. Kerala, with its unique geographical and climatic attributes, faces the daunting task of balancing water demand with supply, particularly in the face of increasing population and climate variability. MoHUA has taken a commendable step forward by advocating for the utilization of treated wastewater, recognizing it as a valuable resource in our quest for sustainable water management. The directive to prepare a policy on the safe reuse of treated wastewater is a testament to the government's commitment to addressing water scarcity and promoting environmental stewardship.

Through this policy, we aim to harness the untapped potential of treated wastewater, thereby alleviating water stress, conserving freshwater resources, and bolstering Kerala's resilience to climatic uncertainties. By reusing treated wastewater for industrial, agricultural, flushing, and fish culture purposes, we not only reduce dependency on finite freshwater sources but also mitigate the environmental impact of untreated wastewater discharge. Kerala has made significant strides in wastewater treatment infrastructure, with STPs boasting a cumulative capacity of 138 MLD. However, the true measure of success lies in our ability to maximize the utilization of this infrastructure and optimize the safe reuse of treated wastewater. By capitalizing on completed STPs and expanding our reuse capabilities, we can unlock the full potential of this valuable resource, safeguarding our water future for generations to come.

This policy underscores the importance of a multi-faceted approach, encompassing infrastructure development, stakeholder engagement, and regulatory frameworks. It calls upon government agencies, industry stakeholders, academia, and civil society to join hands in a concerted effort to realize the vision of a water-secure and sustainable Kerala.

In closing, I extend my sincere gratitude to all those involved in the formulation of this policy, as well as to the stakeholders who will play a pivotal role in its implementation. Together, let us embrace the challenge before us with determination and vision, forging a path toward a brighter, more sustainable future for Kerala.

**U. V. JOSE, IAS (Retd.)**

**Executive Director, Suchitwa Mission**

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**ABBREVIATIONS**

| **BOD** | **:** | **Biochemical Oxygen Demand** |
| --- | --- | --- |
| **COD** | **:** | **Chemical Oxygen Demand** |
| **CPCB** | **:** | **Central Pollution Control Board** |
| **CPHEEO** | **:** | **Central Public Health and Environmental Engineering Organization of MoHUA** |
| **IS** | **:** | **Indian Standards** |
| **KSPCB** | **:** | **Kerala State Pollution Control Board** |
| **LSG** | **:** | **Local Self Government** |
| **MoHUA** | **:** | **Ministry of Housing and Urban Affairs** |
| **O&M** | **:** | **Operation and Maintenance** |
| **PPP** | **:** | **Public Private Participation** |
| **STP** | **:** | **Sewage Treatment Plant** |
| **TDS** | **:** | **Total Dissolved Solids** |
| **TSS** | **:** | **Total Suspended Solids** |
| **TWW** | **:** | **Treated Wastewater** |

**Definitions:**

In this policy, unless the context otherwise requires,

* “**Biochemical Oxygen Demand**” or “**BOD**” means the amount of oxygen utilized by aerobic microorganisms to break down decomposable organic matter in water or wastewater under aerobic conditions;
* “**Bulk Users of Water**” means any private or public commercial/ industrial/ institutional establishments/ residential societies etc. that has an average water consumption of 5000 liters per day;
* “**Chemical Oxygen Demand**” or “**COD**” means the amount of oxygen needed to oxidize total organic and inorganic pollutants in water chemically without the involvement of microbes;
* "**Local Self Government**” means rural and urban self-governments such as Corporation, Municipality, or Grama Panchayat within Kerala State;
* “**Non-potable water**” means water that is not fit for drinking quality, but may still be used for many other purposes, depending on its quality.
* "**On-site liquid waste system**" means a liquid waste system located on-site where the liquid waste is generated;
* “**Off-site liquid waste system**” means a liquid waste system that collects and transports wastewater away from the place it's generated;
* “**Polluter Pays Principle**” is an environmental law principle that holds polluters responsible for the costs of pollution and the damage it causes to the environment;
* “**Potable Water**” means water used for direct human consumption;
* “**Residential Unit**” means a structure that is a residential unit that has sewage-producing fixtures such as sinks, baths, showers, toilets, urinals, dish- and clothes-washers or floor drains for receiving liquid waste including but not limited to only these;
* “**Reuse Responsibility**” means the responsibility/obligation of bulk users like industries, malls, etc. to reuse a considerable portion of water consumption for environmentally sound management of water;
* “**Sewage**” means the wastewater carried through pipes/network of pipes to a sewage treatment plant;
* “**Sludge**” means semisolid, or slurry residual material that is produced as a by-product of wastewater treatment processes which needs to be processed/dried by various sludge management processes;
* “**Treated Wastewater**” means output water from Sewage Treatment Plants (STP) that can be reused for various purposes in accordance with use based on its wastewater characteristics ;
* “**Wastewater or Used water**” means water that has been used for a variety of purposes and is contaminated with substances like human waste, food scraps, oils, soaps, chemicals, etc.;
* “**Wastewater Treatment**” means the processes used to remove contaminants from wastewater and convert it into a standard that can be discharged to the environment in a safe manner as per discharge standards.

1. **Preamble**

Kerala is the southern Indian state with 38,863 km2 area and it is the second most urbanized state in the country. Water plays a critical role in the economy and livelihood of the people of Kerala and water and wastewater management in the state is suboptimal in comparison with other states. The state is accelerating the process of implementation of wastewater infrastructures throughout all the districts. The treated wastewater from the established treatment plant needs management and so, it was directed by the Hon’ble Minister for Local Self-Governments and Excise of Kerala. to formulate a policy for the safe reuse of treated wastewater. As per the directive the committee drafted the policy for the treated wastewater reuse in Kerala.

The State presently adopts both centralized and decentralized approaches for treatment of wastewater. Currently, the available wastewater treatment facilities in the State include Sewage Treatment Plant (STP), Feacal Sludge Treatment Plant (FSTP), and Effluent Treatment Plant (ETP). Though the complete reuse of output water from all these treatment facilities is the final goal to be achieved, this can only be achieved in a phased manner. Hence, as a first phase, we are focusing on the reuse of treated wastewater from STPs. Thus, this policy covers only the aspect of the reuse of treated wastewater from existing and future STPs in Kerala State.

The treated wastewater (TWW) is either discharged to the watercourses or used for irrigating parks, lawns, or public places. Its reuse for non-potable purposes, such as crop irrigation, industrial processes, and groundwater recharge, is still relatively uncommon. Only a small fraction of treated wastewater finds its way back into productive use, representing an untapped resource that could alleviate water scarcity concerns. Non-utilization of TWW is a waste of resources, the capital cost of the treatment facility, and the expense incurred in treating the used water. Treated wastewater is considered as a water resource and is added to the water stock for reuse.

This policy for the safe reuse of treated wastewater makes clear that the treated wastewater from the wastewater treatment plants addresses only the non-potable uses of treated wastewater, i.e., water is not meant for direct human consumption. Considering social sensitivities and public perception towards treated wastewater (TWW), it shall not be used for potable purposes.

1. **Need for Safe Reuse of Treated Wastewater**

Kerala receives copious rainfall, yet faces significant water management challenges that highlight the complexity of its water resources. While some regions experience severe flooding during monsoons, others struggle with water scarcity in non-monsoon months, demonstrating the stark reality of uneven water distribution across the state. This challenge is further intensified by rapid urbanization, population growth, and the increasing impacts of climate change on our freshwater resources.

As our cities expand and water consumption rises, there is mounting pressure on critical resources - particularly water, land, and energy needed for agricultural production and urban development. Implementing comprehensive wastewater treatment and reuse programs presents a strategic solution to these challenges. Such programs can effectively address water scarcity in drought-prone areas while providing reliable water sources for industrial and agricultural needs.

The adoption of treated wastewater reuse serves multiple crucial objectives. The objectives are to:

1. Reduce dependency on existing groundwater and surface water sources, contributing to water security.
2. Create awareness among the public to accept treated wastewater as an alternative source of non-potable use.
3. Protects environmental health, particularly surface water and groundwater in affected areas.
4. Creates a dependable source of water for reuse in irrigation, industrial applications, etc.
5. Enhances socioeconomic conditions in served areas by ensuring reliable water access.
6. Prevent the current pollution in water bodies, mainly caused due to the direct disposal of untreated wastewater.

This approach is not just an environmental solution but a necessity for ensuring Kerala's water security, supporting sustainable economic growth, and building climate resilience across the state. By embracing treated wastewater use, Kerala can better manage its water resources while preparing for future challenges.

1. **Need for Safe Reuse of Treated Wastewater Policy**

The current regulations of Kerala lack a comprehensive policy specifically governing treated wastewater reuse. This policy gap significantly hampers the systematic implementation of wastewater reuse initiatives across the state. While existing regulations provide basic directions for pollution control and environmental protection, which are not addressing the specific requirements, standards, and implementation mechanisms needed for effective treated wastewater reuse programs.

A dedicated treated wastewater reuse policy is crucial for Kerala to establish clear quality standards for different reuse applications, define stakeholder responsibilities, create monitoring mechanisms, and provide guidelines for pricing and distribution. Such a policy would ensure optimal utilization of treated wastewater resources, reduce freshwater demand for non-potable uses, and protect water bodies from pollution. It would also support economic benefits through the creation of alternative water resources for industrial and agricultural use while reducing treatment and disposal costs. The policy would fill current regulatory gaps by providing specific guidelines for infrastructure development, establishing institutional mechanisms, defining quality standards for various reuse applications, and creating frameworks for public-private partnerships. Additionally, it would address critical aspects such as pricing mechanisms, monitoring protocols, and public awareness programs, ultimately contributing to Kerala's water security and environmental sustainability goals.

1. **Vision of the policy**

No wastewater without appropriate treatment shall be discharged to the environment, it will be reused for appropriate purposes to the maximum possible extent. The State of Kerala aims to achieve 65% safe reuse of treated wastewater by 2035.

1. **Objectives of the policy**

A comprehensive policy on treated wastewater reuse is essential to address Kerala's water management challenges. The objectives of the policy are to:

* 1. Ensure maximum safe reuse of treated wastewater in the State.
  2. Provide a clear framework for implementing reuse projects, ensuring public health and environmental safety.
  3. Comply with the quality standards in force for different reuse applications.
  4. Clarify the roles and responsibilities of various stakeholders in treated wastewater reuse.
  5. Expand international cooperation and capacity-building support to developing countries in water and sanitation-related activities and programmes including water harvesting, desalination, water efficiency, wastewater treatment, and reuse technologies.
  6. Ascertain the pricing and incentives for treated wastewater reuse.

1. **Legislation and guidance documents**

The concept of wastewater recycling is recognized by most policy frameworks and institutions in India. Some significant legislations and documents are as follows:

**6.1 Constitutional provisions:**

1. The Constitution of India, part IV, lays down directive principles of State policy. Article 48A states “The State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.”
2. Fundamental duties of every citizen in India: Article 51A states that “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife, and to have compassion for living creatures.”
3. Role of Self-Government (73rd and 74th Constitutional Amendments)- These amendments make it obligatory for the State Governments to constitute Urban Local Bodies and transfer responsibility for water supply and sanitation services to them.

As such, there is a constitutional mandate to preserve, protect, and promote natural resources and water constitutes the most important ingredient of all.

**6.2 Legislative (State and Central) Provisions, Standards, Manuals and Guidelines**

The Treated Wastewater Reuse Policy should be read in accordance with the most current versions of the following, legislations, rules, statutes, policies, and other guidance documents issued at the State and Central levels:

(i) Environmental (Protection) Act, 1986.

(ii) The Environment (Protection) rules, 1986.

(iii) National Water Policy 2012.

(iv) The Water (Prevention and Control of Pollution) Act, 1974, and its amendments.

(v) The Water (Prevention and control of pollution) cess Act, 1974.

(vi) The Water (Prevention and control of pollution)Cess rules, 1978.

(vii) The Water (Prevention and control of pollution)Rules, 1975.

(viii) National Urban Sanitation Policy 2008.

(ix) Quality standards suggested by the Central Pollution Control Board (General Standards For Discharge Of Environmental Pollutants Part-A and wastewater generation discharge standards (Part B) under Schedule-VI of Environment (Protection) Amendment Rules, 2017)

(x) Quality standards suggested by the Kerala State Pollution Control Board (KSPCB SoP, PCB/HO/SEE-3/MISCELLANEOUS/65/2019 dated 15/03/2023)

(xi) Policy Statement for Abatement of Pollution, 1992.

(xii) Manual on Sewerage and Sewage Treatment Systems, by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India, 2013, to name a few such references.

(xiii) Kerala Municipal Act, 1994.

(xiv)Effluent Quality guidelines for health protection measures in aquaculture use of wastewater.

(xv) Quality guidelines for health protection in using human wastes for aquaculture.

(xvi) Standards set for wastewater by the Bureau of Indian Standards (BIS) including IS 17663 2021, etc.

(xvii) National Fecal Sludge and Septage Management Policy ( FSSM 2017).

(xviii) Service Level Benchmark (SLB) of the Ministry of MoHUA mandates the extent of reuse of recycling of sewage in Urban areas by 20%.

(xix) National Guidelines on Zero Liquid Discharge (ZLD) of industries, need to reinforce the requirement for no mixing of Industrial used water and Municipal used water.

(xx) CGWB master plan for artificial recharge to groundwater in India 2020.

(xxi) National Guidelines of Building Code of India, 2016

(xxii) State Water Policy, 2008

(xxiii) Guidelines for Reuse of Treated Sewage in reference to item of Circular Economy, CPCB, dated 08.02.2024

(xxiv) Reuse of Treated Water in Urban/Peri-urban agriculture in India, NITI Aayog, 2023

(xxv) Kerala Municipality Building Rules, 2019 and its amendments

(xxvi) Kerala Panchayath Building Rules, 2019

(xxvii) Groundwater policy, 2020

Even though unmentioned, all the prevailing and upcoming Central and State legislations and guiding documents are also valid under this context.

1. **TWW allocation mechanism**

It shall be mandatory that a minimum of 50% of the wastewater generated by bulk water users should be reused for various purposes after proper treatment within 3 years from the release of this policy. As a stepping stone, the old and new bulk water generators/users shall be given different target percentages for the reuse of TWW with respect to their water consumption. Accordingly, for all new bulk water users at least 30 % of the water consumed for various purposes shall be sourced from treated wastewater. For existing bulk water users, this can be a minimum of 15%. The treated wastewater from STPs should be reused to the maximum possible extent for non-potable purposes, and it shall not be less than 30%.

The bulk water generators/users like industries, apartments, malls, Government/private offices, etc. should have their own wastewater treatment facilities and should ensure that TWW is reused on-site. The TWW can be supplied to bulk water users through separate piping networks at a lower piped water tariff. The TWW will be provided based on the prioritization of the user category as provided in this policy. After the demand of these priority users has been met, the other users outside the supply zone can be allocated the remaining TWW. In the future, the TWW reuse demand may increase, and the availability of TWW may come low for certain areas (even if it does not serve the needs of priority users). In that case, the TWW shall be provided to the users proportionally or in such a way as may be decided by the State Government. Preference may be given to better revenue generation.

Some enforcement shall be made by the concerned departments that give permission for the supply of fresh water to users. The mandatory/bulk users of water like industries/malls etc. shall not be given the allotment of freshwater/reservation of freshwater except as per provisions in the policy. Further, the existing allotment/reservation of fresh water shall stand canceled within one year from the date of TWW being made available after ensuring that the arrangement of supply of TWW to the user(s) is satisfactory. The Central Public Health and Environmental Engineering Organization (CPHEEO) 2013 and Environmental Protection Act, 2012 have provided guidelines for water reuse that provide comprehensive guidelines on treated use, including principles, norms, standards, quality checks, and relevant case studies, representing a significant shift towards more sustainable water management practices that address both water scarcity and environmental concerns.

1. **Technology recommendations**

Wastewater treatment plants may be distinguished by the type of wastewater to be treated. Numerous processes/technologies can be used to treat wastewater depending on the type, extent of contamination, and the expected treated wastewater quality based on reuse applications. The treatment steps include physical, chemical, and biological treatment processes.

A critical area in the planning process of a wastewater treatment system is the identification of an appropriate treatment technology (set of unit processes) that is techno-economically feasible, environmentally safe, and sustainable. The technologies approved under the Manual on Sewerage and Sewage Treatment Systems, 2013 of the Central Public Health and Environmental Engineering Organisation (CPHEEO) can be adopted. In Chapter 7 of Part A of Manual on Sewerage and Sewage Treatment Systems (2013), CPHEEO discusses in detail the different types of treatment technologies suitable under different conditions The manual also provides details on the design considerations and operating requirements for a variety of technologies which will be suitable for different usage.

The policy, while suggesting the use of conventional treatment technologies, does not restrict the exploration of innovative technologies. Thus, the technology options that meet the TWW standards as per the Quality standards suggested by the Central Pollution Control Board and Kerala State Pollution Control Board can be included as technology options for treating wastewater. As this policy focuses on TWW reuse, the aspect of sludge is not covered. But, it should be ensured that the sludge generated in the wastewater treatment plants is treated on-site to meet the fertilizer standards as per the Fertilizer Control Order (FCO) and make it fit for reuse purposes. In cases where the reuse of sludge is impossible, it can be sent to a scientific landfill, etc.

The LSGs/KWA or any public authority authorized for the purpose are at liberty to set up tertiary treatment facilities along with STPs as per prescribed reuse standards and supply treated wastewater for reuse to any beneficiary. This does not restrict the reuse of treated water from any STPs for any purpose by beneficiaries. In such cases, the treated water supplied to the beneficiaries from STPs shall meet the standards for disposal to soakpit prescribed as per KSPCB and it will be the responsibility of the beneficiary to further treat the water using advanced wastewater treatment technologies (like ultrafiltration, disinfection, heavy metal removal, etc.) to meet the required quality standards for the particular use.

1. **User category and prioritizing**

The reuse of treated wastewater can decrease the water demand from surface sources like rivers, ponds, lakes, and also subsurface sources (groundwater), and less consumption of raw water will help conserve natural water resources and promote a circular economy. In recent years, different LSGs and concerned authorities focused on the safe reuse of treated wastewater and initiated the reuse of treated wastewater in horticulture, irrigation, cleaning activities (road, vehicles, etc.), toilet flushing, construction activities, gardening, and utilization for industrial activities. The treated wastewater from STPs should be reused to the maximum possible extent for non-potable purposes, and it shall not be less than 30%.

To promote the safe reuse of treated wastewater of STPs, the potential users have been identified and prioritized. The required TWW quality standards will vary depending on the type of TWW reuse purposes. So, prioritizing the treated wastewater reuse purposes is vital and the treated wastewater reuse standards should comply with the norms set by the CPCB, KSPCB, and CPHEEO. Priorities shall be allocated for the utilization of water for various uses so that the same may become a guideline for all. Looking at the importance of the economy of the Kerala State and the importance of sector development, it is desired to give priority to the distribution of treated wastewater with the following sequence:

1. Irrigation/ Agriculture/Floriculture/Horticulture/Real Estate purposes/Farm forestry/ roadside plantations
2. Landscaping, Gardening & Fire fighting
3. Construction activities (buildings townships, roads, railways, metro-rail, bus depots, and airports)
4. Toilet flushing in newly constructed buildings (plumbing must cater for the treated wastewater usage)
5. Aquaculture purposes
6. Industries (bulk users of water like the textile industry, paper and pulp industry, cooling towers, boilers, etc.)
7. Promotion to help sports activities like the development of Cricket grounds, football grounds, etc.,
8. Bulk water usage cleaning purposes, especially vehicle washing
9. Non-potable uses in bus stations, railways, metro rail, and airports
10. Sprinkling for dust control, especially on roads
11. Rejuvenation of water bodies like lakes/rivers/ ponds etc. for navigation and other uses (especially, water metro)
12. Power generation (Thermal power plants, hydro-power, etc.)
13. Urban landscaping & Green belts
14. Domestic Reuse (Flushing, floor cleaning, lawns, etc.)
15. Groundwater recharging
16. Any Other

Prioritization impacts total water-resource management and therefore demands careful balancing with a perspective for the future. Therefore, these priorities could be modified or added, if necessary keeping in view the characteristics and necessities of the concerned areas and regions. Where effluent is to be used in the industrial processes, it should be the responsibility of the industry to treat it to the quality standards required based on each industry requirements.

1. **Quality standards of treated wastewater and reuse plan**

The Central Pollution Control Board (CPCB) and Kerala State Pollution Control Boards (KSPCB) have implemented norms and guidelines to ensure that the treated wastewater from Sewage Treatment Plants (STP) is of acceptable quality and does not harm the environment or public health. The CPCB [General Standards For Discharge Of Environmental Pollutants Part-A and wastewater generation discharge standards (Part B) under Schedule-VI of Environment (Protection) Amendment Rules, 2017] and KSPCB (SoP, PCB/HO /SEE-3/ MISCELLANEOUS/ 65/2019 dated 15/03/2023) have set specific norms for the water quality of treated wastewater based on the type of treated wastewater reuse plan. Table 7.19 of the Manual on Sewerage and Sewage Treatment Systems, 2013 of the Central Public Health and Environmental Engineering Organisation (CPHEEO) has prescribed standards for the re-use of treated sewage for different purposes like horticulture, irrigation, non-contact impoundments, and washing.

The norms set by the CPCB, KSPCB, and CPHEEO include parameters such as [pH](https://www.netsolwater.com/what-is-ph-in-water.php?blog=4347#:~:text=Water%20is%20neither%20acidic%20nor,and%208.5%20on%20the%20scale.), BOD, TSS, TDS, oil and grease, total coliforms, nitrate, phosphate, and heavy metals. These norms are important to protect the environment and public health from the harmful effects of water pollution. Industries and local bodies need to adhere to these norms, treat wastewater effectively, and reuse the TWW based on the user category prioritization.

As the permissible limits of required water quality vary with each TWW purpose, the tolerance limits with respective codal provisions may be referred to for each TWW reuse plan. For example, the tolerance limit for Irrigation, industrial cooling, or controlled water disposal may be followed as per ISI-IS: 2296-1982. The tolerance limit for water for the pulp and paper industry at different stages of manufacturing is provided in IS: 2724 - 1964. The tolerance limit for water for the textile industry is provided in IS201:I882.

1. **Pricing**

The effluent from the secondary treatment plant is to be further treated in a tertiary treatment plant for reuse. Both of these treatments require a lot of power, skilled manpower, pumping and conveyance of treated wastewater, and O&M cost. It should be remembered that the amount of water reused equals the amount of water saved during consumption. So, if the price is based on the actuals, there will not be much demand from private-sector users. As far as Kerala is concerned, there are alternate availability of freshwater. Also, a piped public water connection exists for most bulk water users.

TWW shall be priced and sold to end users at a price covering at least the operation and maintenance costs of delivery. The treated wastewater shall be made available through separate transmission pipes/other transportation facilities for bulk water users like industries, malls, big hotels, colleges, universities, stadiums, real estate owners, contractors for construction, etc. The bulk water users who use the TWW for their non-potable water requirements shall be charged a cost lesser than the freshwater tariff imposed by the Kerala Government. The beneficiaries will be charged for piping/transportation to the site. The beneficiaries shall ensure that they have a 3-pipe system for the reuse of treated wastewater. The G.O(P) No.11/2023/WRD dated February 2023 may be referred for the tariff currently charged for drinking water.

As a stepping stone, the reuse of treated wastewater shall be implemented in the Government institutions and shall stand as a model for the State. The base tariff for treated wastewater will be fixed by the Kerala State Government by a transparent mode in case of bulk water users/ agriculture/horticulture/fishery/landscape reuse etc.

1. **Incentives**

Each treated wastewater reuse purpose should satisfy the water quality standards prescribed in section 6 of this document/respective guidelines prescribed by the State and Central Government according to treated wastewater reuse options. Incentives may be given as a rebate to stakeholders/ households in the form of tax and other charges as decided by LSGs and the State Government.

1. **Penalty**

Appropriate criteria to apply the "polluter pays" principle shall be established. State Government, through separate orders, can fix the penalty for violations of provisions in this policy.

1. **Business models and PPP**

The role of the private sector will expand with management contracts, concessions, and other forms of private sector participation in wastewater management. The private sector's role in the reuse of treated effluent shall be encouraged and expanded. As there is budget constraint from the Central and the state side the option of the Sewerage Project through Public Private Partnership (PPP) will be explored. The private apartments, villas, and private bulk water users should have their own wastewater treatment facilities and should mandatorily reuse the treated wastewater on-site by complying with the Reuse Responsibility. The TWW should meet the quality standards prescribed by KSPCB, CPCB, and CPHEEO based on the TWW reuse plans. Even after the mandatory reuse activities like toilet flushing, gardening etc., surplus treated wastewater satisfying the discharge norms is generated, and then they may sell the treated wastewater to other beneficiaries within an acceptable user fee. LSG can tender the treated wastewater delivery through private vendors and app-based requests can also be created to ease the process of allocation and digitization of the service delivery. The business models shall be explored in all the sections of the sanitation service chain individually or for the full sanitation service chain or the ecosystem of the wastewater treatment in the locality as it is context and market-specific.

1. **Roles and Responsibilities of the Stakeholders**

The stakeholders for this treated wastewater reuse policy are attached as Annexure in this document. The following are the roles and responsibilities of some of these stakeholders involved in treated wastewater reuse:

| **Stakeholder** | **Responsibilities** |
| --- | --- |
| Local Self Governments | * Develop and enforce regulations for the safe reuse of treated wastewater (bylaws) and pass resolutions for the adoption of those bylaws in the LSG council. * Issue permits for wastewater treatment and reuse projects * Ensure the reuse of infrastructure facilities while issuing the building permit * Coordinate between different stakeholders * Promote public awareness and acceptance of water reuse * Allocate funds for facilitating the use of treated wastewater. |
| Kerala Water Authority | * Ensure treated wastewater meets quality standards for intended reuse * Monitor water quality and maintain records * Implement upgrades to treatment processes as needed |
| Industries Department | * Advocate for industry interests in policy development * Promote best practices for industrial wastewater treatment and reuse * Facilitate knowledge sharing among member companies * Collaborate with utilities and government on research and innovation. * Cooperate with the other stakeholders while assessing the performance of TWW and in the creation of knowledge materials |
| Kerala State Pollution Control Board | * Monitor/ensure that wastewater treatment facilities under its jurisdiction comply with the minimum recovery target of wastewater as prescribed under these rules. * Suspend and/or cancel the registration of bulk users, and/or impose environmental compensation in case of violation of these rules by the registered entity. * Monitor water quality at each stretch of the water bodies where wastewater treatment facilities. * Register obligated entities like bulk users of water and wastewater treatment facilities, via a centralized online portal. |
| Private STP Operators | * Operate and maintain treatment facilities to meet required reuse standards. * Ensure compliance with all relevant regulations and permits. * Coordinate with local utilities for integration into the larger system * Explore opportunities for direct water reuse with nearby industries or agricultural users. * Shall have EUR obligation for wastewater generated based on water consumed to ensure treatment of wastewater generated and reuse treated wastewater for designated uses as per targets. * Procure EUR certificates from registered wastewater treatment facilities. * Establish dual piping in any newly constructed facilities/ premises after these rules come into force. |
| Suchitwa Mission | * Assist in IEC activities * Capacity building to LSGs * Provide technical assistance to the LSG department in the implementation of these interventions * Assess the proposals submitted for treatment infrastructure by LSGs * Coordinate between different stakeholders |
| Agricultural Department | * Shall advocate and disseminate the knowledge of using treated wastewater for irrigation, horticulture purposes, and specifically for farmers. * Explore the possibility of incentives and marketing the produce from those farmers in particular * Providing guidance notes for disseminating the knowledge on the use of treated wastewater for irrigation or horticulture purposes. * Conduct research on cost-effectiveness in the farms using the treated wastewater as their source of water. |
| Groundwater Department | * Promote the usage of treated wastewater for non-potable purposes. Specifically, while issuing permissions the usage of water needs to be assessed for the necessity of using fresh groundwater. * Monitor water quality at the groundwater table, especially in areas nearby wastewater treatment facilities. |

1. **Public Education and IEC**

Education is the key to overcoming the public fears about a reuse system, particularly fears that relate to public health and water quality. The public shall be educated through various means about the risks associated with exposure to untreated wastewater and the value of treated effluents for different end uses.

An in-depth public relations Programme and a demonstration project are especially helpful when the reuse project is the first of its kind in the state. Separate programs for awareness to stakeholders shall be designed and conducted to promote the safe reuse of treated wastewater, methods of irrigation, permissible limits of TWW quality for each purpose, and handling of products. Such programs shall concentrate on methods of protection of farmer's health, animal and bird health, and the environment. As students are young buds, workshops, camps, and training shall be organized at schools/colleges emphasizing the need, and various applications of TWW shall be conducted.

1. **Management Information system**

A well-developed data management and information system is a prime requisite for better management. Therefore, it is important to have data on wastewater generation, treatment of wastewater, recycling of wastewater, method of wastewater treatment plants, safe reuse of treated wastewater income, and expenditure, etc., For the management of all these details a state-level data center may be used. Data so generated shall also be placed in the public domain in order to ensure better transparency, utility, and accountability. Available water resources are required to be planned and allocated for bringing under maximum utilization by assessment (projections) of the demand for water for various uses in the future.

1. **Research Collaborations for Treated Wastewater Reuse**

This policy promotes and facilitates research collaborations to advance treated wastewater reuse practices. It establishes partnerships between universities, research institutions, and water utilities to address priority research areas including advanced treatment technologies, contaminants of emerging concern, health and environmental impact assessments, economic feasibility studies, and social acceptance. A dedicated funding mechanism will support collaborative projects, while conferences, workshops, and publications will facilitate knowledge sharing. Research institutions like NIIST can contribute to providing new technologies or options for the safe reuse of TWW in various fields of applications. Similarly, the technical expertise of NEERI or some other technical consultants shall be sought for technically viable projects for the development of water grids required for irrigation with TWW.

The policy encourages pilot projects to test and demonstrate new technologies and fosters international collaborations to leverage global expertise. A centralized database will be created to store and disseminate research findings and best practices. Interdisciplinary research teams will be promoted, and ethical guidelines for wastewater reuse studies will be developed. The policy also emphasizes the importance of translating research outcomes into practical applications and policy recommendations, ensuring that scientific advancements directly inform and improve wastewater reuse practices.

1. **Implementation Timeline for the Policy**

At present, the stage of development of infrastructure for the collection and treatment of sewage varies from town to town. So the timeframe for achieving the envisaged goals in the policy cannot be uniform and may be different as per realistic and pragmatic approach. The State shall endeavor to use the available TWW to the maximum, but not less than the milestones prescribed in this implementation timeline.

The policy envisages the safe reuse of 65% of overall treated wastewater generated in the State by 2035. Accordingly, the time frame for achieving an overall 65% safe reuse of treated wastewater for the whole of Kerala after notification of this policy is represented as a Gantt chart:

| **TIMELINE (Minimum)** | **20%** | **30%** | **45%** | **65%** |
| --- | --- | --- | --- | --- |
| **2027** |  |  |  |  |
| **2029** |  | |  |  |
| **2032** |  | | |  |
| **2035** |  | | | |

1. **Policy Evaluation**

The State Treated Wastewater Reuse Policy would be a dynamic policy document and would be periodically reviewed, as and when needed, to meet the future wastewater reuse technology development and management challenges. This policy shall come into force from the date of the Executive issue of Government Order or notification in the official gazette of the State.As any interpretation of the provisions of this Policy, the matter shall be referred to the State Government, whose decision thereon shall be final and not challengeable in the Court of Law. As any policy, this policy requires continuous monitoring and revision to comply with the new additions in technology and legislation. Thus, this policy may be revised/monitored at every interval of 5 years.

**Annexure**

**List of stakeholders involved in this Treated Wastewater Reuse Policy:**

1. Kerala Water Authority
2. State Pollution Control Board
3. AMRUT
4. IMPACT Kerala
5. Groundwater Department
6. Irrigation Department
7. Education Department
8. Fisheries Department
9. Suchitwa Mission
10. Directorate of Health Services
11. Department of Agriculture & Farmers Welfare of Kerala
12. Kerala Forest Department
13. State Horticulture Mission Kerala
14. Biotechnology and Model Floriculture Centre, Karshika Keralam
15. Department of Soil & Water Conservation
16. Local Self Government (LSGs)
17. Kerala State Planning Board
18. Kerala Land Development Corporation (KLDC)
19. Kerala Industrial Infrastructure Development Corporation (KINFRA)
20. Airport Authority
21. Public Works Department (PWD)
22. Kerala Infrastructure Development Corporation - KIIDC
23. Indian Railways
24. Kochi Metro Rail Limited (KMRL)
25. Kerala State Road Transport Corporation (KSRTC)
26. Kerala Rural Water Supply and Sanitation Agency (KRWSA)
27. Centre for Water Resources Development and Management (CWRDM)
28. Ministry/Department of Power
29. Directorate of handloom and textiles
30. Environment and climate change
31. Kerala Fire Force
32. Research organizations (NIIST)
33. Kerala Dairy Development Department
34. Directorate of Animal Husbandry
35. Tourism Department
36. Confederation of Real Estate Developers Associations of India (CREDAI)
37. Thiruvananthapuram Development Authority (TRIDA)
38. Flats/Apartments/ Residential Associations in Kerala
39. Car washing centres
40. All Kerala Government Contractor’s Association
41. Chamber of Municipal Chairmen
42. Mayor’s Council
43. Grama Panchayath Association
44. Private STP operators and Institutions with STPs