

KUMASI TECHNICAL UNIVERSITY



**WATER AND SANITATION
POLICY FRAMEWORK**

August, 2024

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1.0 INTRODUCTION

While global warming further exacerbates the water scarcity challenge, rapid population growth and urbanization have triggered increased water and sanitation demand, and competition for the already limited water and environmental resources. Therefore, there is a need to make more efficient and environmentally friendly use of water and waste, including water reuse options identification. The WHO/UNICEF JMP argue that clean and adequate water supply and improved sanitation are critical to man's survival and central to achieving Sustainable Development Goal Six (SDG 6). It is thus appropriate that the Kumasi Technical University (KSTU) community primarily aligns its water and sanitation interventions with SDG 6, which seeks to ensure clean and adequate water for all and improved sanitation.

As a hygienic way of promoting health through the prevention of human contact with waste, particularly excreta, sanitation entails the collection, transportation, treatment, and appropriate disposal of waste. The purpose of sanitation provision is therefore to reduce (or eradicate) the spread of diseases, protect the environment, and ensure that waste is sufficiently treated before disposal or reuse. Unhealthy sanitation practices, beliefs, and attitudes largely contribute to adverse public health outcomes. Though water and sanitation challenges are self-inflicted, sustainable development and public health cannot be significantly improved without dealing with these challenges. Therefore, water supply and sanitation are central to sustainable development and public health improvement. This policy framework is therefore an important component of the University's wider sustainability strategy.

1.1 Aim of policy framework

The aim of this policy document is to provide a framework for the promotion of sustainable management of water and sanitation within the University community and its environs in alignment with SDG 6 to ensure the University's contribution to the global effort on clean and adequate access to water and sanitation for all.

1.2 Objectives of policy framework

Kumasi Technical University's water and sanitation policy framework is grounded on the following specific objectives:

- i. Assess the current water and sanitation situation in the University, including sanitation
- ii. practices and water usage;
- iii. Identify potential for water and sanitation efficiency improvement, waste generation reduction, and sustainable sanitation practices;
- iv. Recommend water and sanitation sustainability interventions and practices to be integrated into the University's curricula and research activities;
- v. Propose strategies and initiatives to promote sustainable water management and sanitation practices among staff and students, and the surrounding communities; and
- vi. Make any other recommendations to promote the efficient and sustainable use of water and sanitation practices within the University.

1.3 Scope of policy framework

The Water and Sanitation Framework (WSPF) of Kumasi Technical University shall apply to the main campus (Asem), Adako Jachie campus, Kuntense campus, Juansa campus, and any other campuses created in the future.

2.0 CURRENT WATER SUPPLY AND SANITATION SITUATION

Boreholes are the main source of water supply to KSTU campuses, though a few university residences such as Vice Chancellor's and the Bomso house rely on water from Ghana Water Company Limited (GWCL). Therefore, GWCL is an alternative source of water supply when there are challenges with the existing boreholes.

2.1 Water use principles

The water-use principles outlined below shall guide the University's policy framework but are subject to periodic review.

2.1.1 Monitoring and measuring water use

Using existing sub-meters, the University monitors water consumption at the entrance points to residences and buildings. Where there is no visibility, additional sub-meters are installed, and major water-consuming equipment is monitored. By investigating and understanding the usage trend and pattern, abnormal usage is identified, including leakages.

2.1.2 Compliance

The University should ensure that its operations comply with the legislative requirements on water conservation and management.

2.1.3 Water conservation

The University periodically evaluates water-using equipment, including washroom facilities, and halls of residence, and where applicable replaces equipment with water-efficient ones. It is well documented that ageing washroom facilities use considerably more water than modern fittings. Replacement of ageing fixtures via a targeted programme across the University and halls of residence would reduce water use.

2.1.4 Building and maintenance standards

The University's Strategic Development Plan (SDP) requires the construction and refurbishment of buildings. In the construction of new buildings, however, it is essential that the best standards of water efficiency are pursued to minimize water use and associated costs over the operational lifetime. This process begins with the project inception in the assessment of proposed water reduction technologies. Good standards of maintenance are fundamental to water use reduction across campuses and residences. The immediate identification and repair of leakages cannot be understated due to the cumulative effect of this water use. Maintenance teams frequently visit the back of buildings to identify leakages which would otherwise go unnoticed.

2.1.5 Procurement

The University shall establish procedures for assessing the water efficiency of new equipment through a cross-department approach to working with procurement teams.

2.1.6 Engagements and collaborations

Since both students and staff influence water use daily, the key to success in water use reduction is engagement with both parties across the University. The University will establish behavioural change campaigns for staff and students to educate and empower them to take action on water use reduction. Collaboration will also follow in the form of supporting student and academic projects by providing water data and expertise, whilst facilitating the implementation of onsite-demonstrator projects. This will enhance the University's research bids by providing on-site projects whilst contributing to an increased chance of research success.

2.2 Water usage at KsTU campuses

The under-listed water use options currently exist on KsTU campuses and residences:

- i. Student household uses – washing, cooking, drinking, and bathing;
- ii. Staff usage – washing, cooking, bathing, drinking, car washing;
- iii. Constructional works uses;
- iv. Janitorial and cleaning works;
- v. Landscaping uses;
- vi. Agricultural purposes; and
- vii. Artisanal and air-conditioning services.

2.3 Current borehole water sources

As shown in Table 1, the current water sources and facilities available on KsTU campuses and residences are provided.

Table 1: Water sources on KsTU campuses and residences

Main Campus						
No.	Location of Borehole	Pump Type and Capacity	Borehole Yield/ Depth	Qty.	Status	Works Done/ Required Recommendations
1.	New Great Hall Frontage (connected to the reservoir)	Submersible 1.5HP	97 l/ min 60 m	1	Functional	Rejuvenation done on 11 th May, 2024
2.	Block D (Side)- (connected to the reservoir)	Submersible 1.0 HP	31 l/min 52m	1	Functional	Rejuvenation done on 11 th May, 2024
3.	Block C (Car Park) (connected to the reservoir)	Submersible 1.5HP	78 l/min	1	Functional	Rejuvenation yet to be done

4.	Block C (Behind Brick House) (connected to the reservoir)	Submersible 1.5HP	52 l/min 52m	1	Functional	Rejuvenation done on 11 th May, 2024
5.	Pat Carless (connected to the Pat Carless Hall and BTech Extension block)	Submersible 2.0HP	52 l/min 52m	1	Functional	Rejuvenation done on 11 th May, 2024
6.	Liberty Hall (connected to the Liberty and Ashanti halls)	Submersible 1.5HP	52 l/min 52m	1	Functional	Rejuvenation done on 3 rd August, 2024
7.	MPC (Not connected to any building)	-	-	1	Not Functional	Complete rehabilitation required -Viability check

8.	Block C (close to the staircase near the credit union block) (connected to the reservoir)	No pump	52 l/min 52m	-	Not in use	Requires the placement a new submersible pump. Rejuvenation done on 11th May, 2024
Piase						
1.	Energy center	Submersible 1.5HP	57 l/min	1	Functional	Rejuvenation yet to be done
2.	Warehouse	Submersible 1.5HP	52/min	1	Functional	Rejuvenation yet to be done
Adako Jachie						
1.	SRC Hostel	Submersible 1.5HP	52 l/min 52m	2	Functional	Rejuvenation yet to be done
2.	GET Fund Hostel	Submersible 1.5HP	78 l/min 52 l/min 78 l/min	3	-One Functional -Two not functional	Rejuvenation yet to be done

3.	FBNE Block	Submersible 1.5HP	52 l/min	1	Functional	Rejuvenation yet to be done
4.	Senior Members Bungalow	Submersible 1.5HP	78 l/min	2	Not Functional	Requires viability test. Water is dirty but 1 borehole connected for the agro farms. Rejuvenation yet to be done
5.	Senior Staff Bungalow	Submersible 1.5HP	52 l/min	1	Functional	Rejuvenation yet to be done
6.	Junior Staff Bungalow	Submersible 1.5HP	78 l/min	1	Functional	Rejuvenation yet to be done
7.	AVIC Workshop	Submersible 1.5HP	-	1	Functional	Rejuvenation yet to be done

2.4 KsTU water storage facilities

The water storage facilities on KsTU campuses and residences are predominantly of the Rambo 250 – 600 and Hippo 200 – 280 types. Tables 2 (a), 2 (b), 2 (c) and 3 show the water storage facilities available on the two (2) main campuses, Asem and Adako Jackie.

Table 2 (a): Main Asem campus water storage facilities

Location	Number	Type	Capacity (l)
1. Workshops	1	Rambo 250	2.5
2 . BTech Block	1	Rambo 500	5.0
	1	Rambo 250	2.5
	2	Rambo 250	5.0
	4	Hippo 200	8.0
	2	Hippo 200	4.0
	4	Rambo 300	12.0
3. BTech Extension	2	Rambo 300	6.0
4. Zongo Block	6	Hippo 200	12.0
	1	Rambo 500	5.0
5 . Block A	1	Rambo 300	3
	2	Hippo 200	4
	4	Hippo 280	11.2
6. Block B	1	Hippo 200	2
7. Block C	1	Rambo 350	3.5
	1	Rambo 250	2.5
	2	Hippo 200	2.0
8. Dept of Lab Tech/ Clinic	2	Rambo 250	5.0

9. MP Block	4	Rambo 350	14
	1	Rambo 500	5.0
	1	Rambo 450	4.5
10. Administration Block	3	Rambo 300	9.0
	3	Hippo 200	6.0
11. Central Reservoir	1	Concrete tank	263

Table 2 (b): Main Asem campus water storage facilities

Location	Number	Type	Capacity ()
12. PatCarless Hall	3	Rambo 500	15
	1	Hippo 200	2
	1	Rambo 250	2.5
	1	Poly tank 3000	3
13. Ashanti Hall	1	Hippo 200	2
	2	Hippo 200	4
14. Liberty Hall	1	Rambo 140	1.4
	1	Rambo 600	6
	1	Rambo 500	5
	4	Rambo 300	12
	1	Hippo 280	2.8

15. PatCarless Bungalow	1	Rambo 250	2.5
16. Brick House Bungalow	1	Rambo 250	2.5
TOTAL (2 a & b)	70		439.2

Table 2 (c): Main Asem campus water storage facilities

Administration Block A	1	Surface pump	2HP	1 NO surface pump GF
MPC Block	1	Surface pump	2HP	1 NO surface pump GF
Block D	1	Surface pump	2HP	1 NO surface pump GF
Btech Extension	1	Surface pump	2HP	1 NO surface pump GF
Btech Block	1	Surface pump	5.5HP	1 NO surface pump GF
Partcarless Hall	1	Surface pump	2HP	1 NO surface pump GF

Table 3: Adako Jachie campus water storage facilities

S/N	Location	Quantity	Capacity (litres)
1	GETFund ceiling (A & B blocks)	12	3000
2	GETFund ground floor	2	25500
3	GETFund washing room	2	8500

4	SRC Overhead	4	3500
5	SRC behind (drying line area)	1	8500
6	IDMT Workshop	1	3000
7	AVIC Workshop overhead	1	7000
8	AVIC ground level	1	2200
9	FBNE overhead	4	2500
10	FBNE ground level	2	5000
11	Junior Staff overhead	4	3500
12	Junior Staff ground level	2	4000
13	Senior Staff ground level	1	2000
14	Senior Staff overhead	2	2500
15	Senior Members overhead	2	5000
16	Senior Members ground level	1	200
17*	Police Station	1	2500

2.5 Environmental supervision

As activities of the University authorities to identify, prevent, and combat threats and eliminate offences in the field of environmental protection, environmental practices would have the following hierarchy as general Supervisors:

- i. Directorate of Works and Physical Development
 - (a) Estates and Municipal Services Department
 - (b) Environment and Grounds Section
- ii. The following tasks shall be the responsibility of Supervisors:
 - (a) Space (offices, classrooms, halls, halls of residences, washrooms, environs) cleaning services;

- (b) Waste collection and disposal;
- (c) Landscaping works (lawns, hedges and tree control);
- (d) Dislodgement and unblocking of inspection chambers and sewage lines;
- (e) Solid waste management;
- (f) Fumigation and pest control;
- (g) Manual works;
- (h) Besides, Estate and Municipal Services Department Officers shall undertake morning and afternoon daily inspections on cleaning and other environmental works;
- (i) Outsourced environmental works such as janitorial services to be supervised by the outsourced supervisors and monitored by Estate and Municipal Services Department Officers;
- (j) Attendance forms would be placed at vantage points to monitor the works of cleaners daily; and
- (k) Cleaning works checklist to be used to record attendance works by internal and outsourced cleaning staff.

2.6 Cleaning of drains and gutters

Cleaning of drains and gutters does not only prevent ponding which leads to mosquito breeding, but also prevents leaf litter and other debris from clogging drains and gutters, thereby creating a greater risk of floods.

2.6.1 Weekly thorough cleaning

Drains and gutters are to be thoroughly cleaned once a week by either internal or outsourced cleaning staff, and the following materials are required for the cleaning:

- i. Hard brushes;
- ii. Akeshaa (sodium);
- iii. Washing powder or liquid soap;
- iv. Town Council brooms; and
- v. Personal Protective Equipment (PPE).

2.6.2 Daily cleaning

Sanitary cleaners shall pick up waste materials (rubbers, papers, wood, among others) in gutters every morning on a daily basis.

2.7 Grounds and garden works

To keep the lawns, hedges and trees in good shape and aesthetics, the following works are undertaken by Gardeners:

- i. Continuous professional training for university Gardeners;
- ii. Periodic checks on trees, hedges and lawns by Estate and Municipal Services Department Gardeners and Officers;
- iii. Periodic pruning of trees;
- iv. Periodic trimming of hedges;
- v. Periodic replacement of dead trees and hedges;
- vi. Application of fertilizer on hedges, trees not growing

well;

- vii. Application of pesticides, and insecticides on plants infested by pests and insects; and
- viii. Regular planting of green grasses and hedges on open and unpaved areas.

2.7.1 Lawns maintenance

Lawn maintenance enhances the overall aesthetic of the campuses, promotes lawn development and growth, controls weeds and pests, and saves money. Lawns maintenance would be done through:

- i. Regular removal of weeds from lawns;
- ii. Mowing on lawns as and when necessary to keep them in shape;
- iii. Prevention of walking on lawns;
- iv. Procurement of quality and durable lawn mowers and associated materials such as mower oil and other parts to ensure continued use; and
- v. Provision and use of Personal Protective Equipment for grounds and gardening works.

2.7.2 Hedges maintenance

Hedges maintenance would be done through:

- i. Periodic trimming;
- ii. Application of insecticides and pesticides where necessary; and
- iii. Replacement of dead hedges.

2.7.3 Weeds control

Weeds would be controlled by periodic:

- i. Removal from paved areas with hoes and cutlasses; and
- ii. Application of weedicides on weeds.

2.8 Sanitation at the University Clinic

Safe water, sanitation, and hygiene (WASH) provision at the university Clinic is critical to quality healthcare. Healthcare delivery is inevitable in every institution to provide both students and staff with the necessary basic healthcare needs. Doors, door locks, tables, chairs, beds, fans, lamp holders, light switches, air conditioners, storage facilities (for instance, fridge) sockets, louvre blades and other carriers are maintained periodically. The schedule for cleaning the University Clinic is shown in Table 4.

Table 4: Cleaning services schedule at the University Clinic

Place	Task	Frequency
Clinic	Sweeping	Every working day
	Cleaning of tables & chairs	Every working day
	Cleaning of louvre blades	Once a week
	Removal of cobweb	Once every two weeks
	Cleaning of fans	Once every month
	Washing of curtains	Once every year
	Cleaning of carpets	Weekly vacuuming Dry cleaning once a year

Washrooms	Sweeping	Daily
	Mopping	Daily
	Cleaning of wash hand basin	Twice in a day
	Cleaning of urinal/toilet bowls	Twice in a day
	Removal of cobweb	Every two weeks
Used syringes & other medical items	Burnt as and when necessary	

2.9 Disinfection and disinfestation

To eradicate micro-organisms, rodents, insects and pests from campuses, the following activities shall be undertaken periodically:

- i. Disinfection of all boreholes every six (6) months;
- ii. Cleaning and washing of all water storage facilities every six (6) months; and
- iii. Fumigation exercises at the halls of residence, offices, lecture rooms, drains, laboratories, cafeteria, restaurants and the immediate environment every year.

2.10 Waste management

Liquid and solid waste management entails waste segregation at the source and its safe transportation from the source to either disposal sites for further treatment or recycling. Proper management of the University's liquid and solid waste therefore has accrued benefits, key among them include protection of the environment, cost savings or reduced expenses on waste disposal, and disease prevention.

2.10.1 Liquid waste management

The main Asem campus has a centralized system which connects the University sewage system to the city's main sewer system through a combination of inspection chambers which join the various blocks on campus. However, the Adako Jachie and Piase campuses have septic tanks constructed for the various blocks which partially treat the wastewater but periodically empty when full for disposal.

2.10.2 Solid waste management

As a complete chain that involves the collection, treatment, transportation, analysis, and disposal or reuse of waste, any break in the solid waste management chain means solid waste is heaped up on university campuses and residences which then becomes a problem for both the environment and public health.

2.10.3 Solid waste sources on KsTU campuses

The following solid waste sources have been identified across KsTU campuses:

- i. Offices;
- ii. Classrooms;
- iii. Vendors;
- iv. Halls of residences;
- v. Restaurant; and
- vi. Libraries (Bindery unit).

2.10.4 Categories of solid waste generated

On solid waste generated, the following waste categories are available:

- i. Paper and cardboard;
- ii. Plastics and rubbers;
- iii. Metals;
- iv. Glass;
- v. Wood; and
- vi. Organics.

2.10.5 Solid waste collection and disposal

Various sizes of waste bins have been placed in offices, verandas, corridors, and open areas to collect waste daily. Cleaners are tasked to clean the various spaces, and empty bins, and dump them in the bigger skip container for final disposal by an outsourced company. The skip container is emptied as and when full by the outsourced company.

2.10.6 Waste segregation strategy in KSTU

The University has recently signed an agreement with Senga Recycling and Packaging (SRP) located at Kwamo-Ejisu in June 2024 under the following terms:

- i. SRP shall collect and transport paper and cardboard, plastics, metals, glass, organics, and all other recyclable waste items from KSTU campus and its environs for recycling at its facility owned by SRP and its partners;

- ii. KsTU shall work out the modalities under which the recyclable waste materials can be collected and transported from KsTU campuses and its environs by SRP;
- iii. KsTU shall provide full details of recyclable waste materials collection points to SRP within a reasonable period after the execution of the MOU;
- iv. KsTU shall ensure the recyclable waste materials collected for transportation by SRP are not collected by anybody else;
- v. SRP shall provide 50 appropriately labelled and colour-coded bins free of charge to KsTU at five (5) vantage points in five main waste areas;
- vi. SRP shall provide free sensitization and education to the KsTU community and its environs on proper waste disposal and environmental cleanliness;
- vii. SRP shall provide opportunities to promote research via KsTU academic departments and its affiliated Institutions; and
- viii. The agreement shall be valid for an eight (8)-year period from 3rd June 2024 to 3rd June 2032.

2.11 Environmental staff use of personal protective equipment (PPEs)

To ensure staff involved in environmental services are secured and protected from risks substances, the following should be adhered to:

- i. Regular provision of PPE at the beginning of the year and

also as and when necessary. These materials should be captured in the yearly budget for sanitation by the Estate and notables should include hand gloves (disposables), PVC hand gloves, nose masks, eye goggles, safety boots, overcoats, overalls and helmets;

- ii. Mandatory wearing of the PPE by required staff for staff;
- iii. Mandatory inspection of the wearing of the PPEs before work by supervisors;
- iv. Management of the University shall not be liable to pay damages where staff fails to wear and results in injuries;
- v. Periodic training of environmental staff on usage of PPE; and
- vi. Replacement of worn-out PPEs where necessary.

2.11.1 Outer fence wall cleaning

To ensure the immediate environs of the University is clean, the following activities shall be undertaken:

- i. Sanitary labourers would be tasked to clean these places every morning
- ii. Vendors would not be allowed to trade at these places;
- iii. Vendors who occupy these places would be ejected immediately with the help of the Security Unit;
- iv. Regular weeding on areas not paved; and
- v. Ensure areas are paved.

2.11.2 Staff residential cleaning

Aside from the Vice Chancellor's residence, all other staff occupying university accommodation are responsible for cleaning works on and around the premises. Inspection of all staff residential premises belonging to the University shall be done quarterly to ensure compliance. The Vice Chancellor's residence shall therefore be provided with the following services:

- i. Regular weeding and mowing on and around the premises; and
- ii. Waste collection and disposal.

2.11.3 Hostel cleaning

- i. Cleaning labour force

Cleaning of halls of residence shall be done by any of the following categories of cleaners:

- (a) Permanent staff;
- (b) Contract staff; and
- (c) Outsourced company staff.

- ii. Cleaning schedule

Cleaning of washrooms, staircases, offices, lecture halls, and university surroundings and its environs shall be done as follows:

- (a) Washrooms – four (4) times daily;
- (b) Offices and lecture halls – once daily; and
- (c) University surroundings and its environs – once daily.

iii. Cleaning works required

The under-listed cleaning works shall be carried out as specified under the framework:

- (a) Clean and scrub all surfaces in washrooms;
- (b) Wipe and disinfect all surfaces;
- (c) Clean all mirrors;
- (d) Mop all floor surfaces;
- (e) Remove cobwebs; and
- (f) Clean and remove dirt on all office equipment.

2.12 Sanitation at vending places

Specific places would be allocated for vending on all university campuses, and vendors shall clean areas allocated to them daily before and after work. Mandatory medical screening of all vendors by the University Clinic every two (2) years shall be conducted, and vendors shall submit the medical report Estate Officer before the start of operations on university campuses.

2.13 Current sanitation practices at KsTU

- i. Janitorial and cleaning services;
- ii. Waste collection and disposal;
- iii. Fumigation exercises;
- iv. Partial solid waster segregation;
- v. Properly disposal of liquid waste;

- vi. Use of Personal PPE for environment works; and
- vii. Yearly provision of environment services requirements.

3.0 SUSTAINABILITY IN WATER EFFICIENCY AND WASTE REDUCTION

Water efficiency and waste reduction interventions are strategies that enhance water sustainability, help reduce water withdrawals from over-tapped rivers and aquifers, and save energy, thereby leading to greenhouse gas emissions reduction and the impact of climate change. The proposed strategies are towards sustaining water systems, reducing wastage and overall water consumption reduction.

3.1 Comprehensive maintenance schedule for all KsTU boreholes

Activity	Regularity of activity
Phase 1	
(h) Rejuvenation of all KsTU boreholes.	Every six (6) months
(i) Water quality analysis (physicochemical & biological) of all boreholes on campuses.	
(j) Disinfection of all boreholes.	Once
(k) Provision of filters (inlet and outlets) on all water storage facilities	

<p>Phase 2</p> <p>Replacement of all faulty and malfunctioning water pumps (submersible & surface), and the installation of control panel on all pumps without it. The control panel would be installed on all pumps with 2HP and above to control/ regulate the pumps against power fluctuations and other related challenges.</p>	<p>Yearly basis as and when necessary</p>
<p>Phase 3</p> <p>Procurement of spare (backup) pumps at stores to cater for unexpected failures that may occur.</p>	<p>At least yearly, as and when necessary</p>

3.2 Sustainability of sanitation practices

For sanitation practices sustainability, there shall be continuous:

- i. Provision of required quality environmental services and materials;
- ii. Maintenance of inspection chambers and the centralized liquid waste system;
- iii. Education to the university community on good sanitation practices;
- iv. Provision of PPEs to environmental staff;
- v. Training to environmental services supervisors.

3.3 Other sustainability interventions

Other measures and practices largely to improve water use sustainability include:

- i. Develop a reliable, robust and functional Central Water System where all the overhead reservoirs will be controlled from a central point to reduce time and man hours used in moving from one point to another to control the flow of water;
- ii. The Estate Office shall embark on periodic programmes to engage staff and students on faculty, hall, and directorate levels to sustain the education and awareness on water savings;
- iii. Procurement and use of only quality and efficient plumbing fittings and pumps that will ensure durability and desist from lowest bidder mantra;
- iv. Engage the right, qualified and adequate staff, such as water systems staff and plumbers (among others), to help in water management;
- v. Adopt sensors on pumps to ensure that there are no spillages and overflows, thereby reducing wastage;
- vi. Fixing of sensor taps on wash-hand basins and sinks in washrooms and kitchens respectively;
- vii. Fix quality and durable ball valves in all tanks to cut the flow of water when the tank is full;
- viii. Use push taps on urinal bowls instead of normal cork-type taps;

- ix. Explore the possibility of harvesting rainwater which could be used in washrooms and for cleaning. This will require re-configuration of water systems into washrooms, and wastewater passed through a sedimentation process to filter it;
- x. Adopt dual-flushing water closets and cisterns in all washrooms to save water;
- xi. There should be an embargo on washing of staff vehicles on university campuses;
- xii. The practice of water withdrawals from campuses to homes should be stopped;
- xiii. Vendors should be prevented from cooking on the campuses;
- xiv. Regular and comprehensive inspection of water pipes by Plumbers; and
- xv. Fixing of low-flow shower heads on all showers in the washrooms.

4.0 GOVERNANCE STRUCTURE AND KEY DUTIES

4.1 Responsibilities of the University Council

The University Council shall:

- i. Regularly evaluate and update water and sanitation guidelines to ensure they satisfy current standards and university requirements;
- ii. Establishing clear goals for water conservation and sanitation improvement across campuses;

- iii. Provide appropriate resources for the upgrade and upkeep of water and sanitation facilities;
- iv. Foster partnerships with local water authorities and sanitation experts to improve the University's practices; and
- v. Oversee the installation of water-saving devices in new and existing university buildings.

4.2 The Vice-Chancellor

The Vice-Chancellor is responsible for the:

- i. Development and implementation of a comprehensive Water and Sanitation Policy Framework;
- ii. Promotion of culture of water conservation and proper sanitation practices among staff and students;
- iii. Establishment of key performance indicators (KPIs) for water usage and sanitation standards across all university departments; and
- iv. Annual reporting to the Council on Water and Sanitation Performance and Initiatives.

4.3 Directors, Deans, and Heads of Departments

These leaders must:

- i. Integrate water conservation and sanitation practices into respective areas of responsibility;
- ii. Conduct regular audits of water usage and sanitation

facilities within departments;

- iii. Encourage research and innovation in water and sanitation technologies that are relevant to fields of study; and
- iv. Ensure compliance with university-wide water and sanitation policies within units.

4.4 Staff and students

All members of the university community are expected to:

- i. Adhere to water conservation practices and proper sanitation habits;
- ii. Report water leaks, faulty sanitation facilities, and other related issues promptly;
- iii. Participate in water and sanitation awareness programs organised by the university; and
- iv. Suggest improvements for water and sanitation practices in their immediate environment.

4.5 The Water and sanitation office

This office is responsible for:

- i. Monitoring of daily water consumption and wastewater production across campuses;
- ii. Managing the maintenance and upgrade of water and sanitation infrastructure;
- iii. Conducting regular water quality tests and publishing results to the university community;

- iv. Organising training sessions on the proper use of water resources and sanitation facilities;
- v. Developing and implementing a drought management plan for the university;
- vi. Exploring and implementing rainwater harvesting and greywater recycling systems where feasible; and
- vii. Communicating with local authorities about more general water and sanitation issues affecting the university community.

5.0 SUSTAINABLE WATER MANAGEMENT AND SANITATION PRACTICES PROMOTION

Non-economic water use, non-revenue water (NRW), and bad sanitation practices and attitudes are known barriers to sustainable water management and acceptable sanitation delivery in Ghana, KsTU community and its environs inclusive. The cost implications to the university community are that huge sums of money are spent monthly in waste collection and disposal, and on electricity bills due to the need for water to be pumped from boreholes. Therefore, to promote the sustainable water use and sanitation practices among staff and students of the university community, the following interventions are proposed:

- i. Sensitization and education of the university community and its environs on best sanitation practices and economical water use through periodic engagements with the staff and students;
- ii. Yearly faculty orientations for fresh students should include presentations by experts on best sanitation

- practices and economic water use;
- iii. World Water Day and World Sanitation Day should be marked by floats in Kumasi to create awareness on the dangers of inappropriate waste disposal, NRW generation, and non-economic water use; and
 - iv. KsTU should ensure that that aspect of the signed agreement with Senga Recycling and Packaging (SRP) to provide free sensitization and education to the KsTU community on proper waste disposal and environmental cleanliness is implemented.

6.0 WATER AND SANITATION INTERVENTIONS INTEGRATION INTO UNIVERSITY'S RESEARCH

To further harness the KsTU's Water and Sanitation Policy framework, the integration of water and sanitation sustainability interventions be integrated into the university's research activities and proposed as follows:

- i. Behavioral change campaign teams be established within the university community for both staff and students to educate and empower them to promote water use reduction and waste minimization attitudes and practices;
- ii. To enhance the University's research bids by providing on-site projects and increased chance of research success, water and sanitation data and expertise provision to support students' academic projects whilst facilitating the implementation of onsite-demonstrator projects; and

- iii. KsTU should ensure that the signed agreement with Senga Recycling and Packaging (SRP) to provide opportunities for research on and off the university's campuses through the academic departments and affiliated Institutions is implemented.

7.0 POLICY FRAMEWORK RECOMMENDATIONS

The following recommendations are hereby made under KsTU's water and sanitation policy framework:

- i. Waste minimization, appropriate waste disposal, and economic use of water shall be the norm in all aspects of the university community, students and staff alike;
- ii. However, once waste must be generated even if minimized, alternative uses such as waste conversion to power (biogas), fertilizer or compost, and waste sorting and recycling should be explored;
- iii. Rainwater harvesting be explored as an alternative water source for use by the university community in washrooms and other cleaning purposes to reduce the rising cost of electricity bills due to the need to pump water from the available boreholes; and
- iv. All provisions in this water and sanitation policy framework should be implemented and enforced.

8.0 CONCLUSIONS

Though water and sanitation challenges are generally self-inflicted, sustainable development and public health cannot significantly improve without dealing with the challenges. Therefore, urgent and deliberate interventions are needed to reverse the current trend.

Well-designed and coordinated sensitization drives across all KsTU campuses and its environs on sustainable and economic water use and appropriate sanitation practices and attitudes are critical to surmount the water and sanitation challenges. Implementation of this framework's recommendations will bring significant cost savings to the university, promote cleanliness and aesthetics of the university environment, prevent floods within the university's campuses and its environs, prevent diseases among students and staff, and help to achieve SDG 6 which seeks to ensure clean and adequate water for all and improves sanitation provision.