MASTER CLASS
WATER AND SANITATION
MILE
IN PARTNERSHIP WITH
WATER AND SANITATION UNIT
Edition No: 05/2011
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Acronyms and Abbreviations

LN    Learning Notes
WSU   Water and Sanitation Unit
MILE  Municipal Institute of Learning
UKZN  University of KwaZulu Natal
ISD   Institutional and Social Development
HSRC  Human Science Research Council
PRG   Pollution Research Group
O & M Operation & Maintenance
GIS   Geographical Information System
EWS   eThekwini Water and Sanitation
About Learning Notes

The Learning Notes (LNs) are intended to serve as reminders of key issues, discussions and challenges that emanated from the Water and Sanitation Master Class hosted by MILE in partnership with the Water and Sanitation Unit (WSU) on 01 to 03 June 2011. They are based on lessons learnt from experience, accumulated knowledge and current innovations in the eThekwini Municipality. The intended users of these LNs are people involved in Water and Sanitation Programmes.

In each topic discussed, the first section identifies ‘issues and challenges’ to be considered. The second section indicates the ‘lessons learnt’. The final section, ‘sources of information and examples of good practice’, directs users to some relevant examples drawn from eThekwini Water and Sanitation projects, programmes, and other sources and relevant information. The LNs seek to assist in generating information required to prepare and enhance the quality of water and sanitation management as well as service delivery in general. It is hoped that the session will go a long way in assisting municipalities to provide practical solutions to water and sanitation challenges.

These LNs attempt to guide and support practitioners to enhance service delivery by providing reminders of issues and recommendations which will help them in dealing with important decisions during the design execution and evaluation of projects and programmes. They are an attempt to crystallize knowledge and lessons learnt, drawing on eThekwini Municipality’s experiences. It is assumed that LN users have had some exposure to water and sanitation related matters, but for those less familiar, links will also be provided to sources of more detailed information and examples of good practice. The LN themes are grouped under the domains to which they relate. Comments and suggestions for the improvement of these LNs are welcome. This is an open ended series of LN updated and improved on an ongoing basis. More will be added as necessary. These, together with requests for further information, should be addressed to mile@durban.gov.za.
Introduction

Sogen Moodley, a Senior Manager, responsible for MILE, took some time to welcome the participants and laid some ground rules to help us achieve a desired outcome. He highlighted the purpose of the Master Class that was to enhance technical capacity in order to improve service delivery in respective municipalities. He mentioned that the predominant focus of MILE is to develop the capacity of local government professionals in Southern Africa. One of the learning mechanisms that are used to achieve this goal is the Master Classes programme that extends over a three- to five-day period. In the first two days, practitioners are exposed to intensive, interactive sessions including a mix of lectures, presentations, seminars and working through case study materials and exercises. The three days take the practitioners outside the campus to meet professionals on-site, at their places of work. Site visits and tours to current projects, and interviews with Project Managers, are also part of the programme.

The Master Classes are run by professionals who are experts in their field, often internationally-recognised for their contributions to their field. These experts are drawn from eThekwini Municipality and other municipalities that may be interested, and supplemented with academics from partner tertiary institutions. MILE aims to enhance the capacity of local government practitioners. One of the key learning mechanisms in achieving this goal is the MILE Master Class – which is essentially an experiential action learning engagement lead by an ‘expert’ drawn from either eThekwini municipality or one of its learning partners across the continent. The Master Class sessions are targeted at municipal practitioners directly involved in the respective content areas. Whilst it is primarily designed for officials at a technical and managerial level, Councillors involved in these fields may also benefit. At this stage, all Master Classes are run in English. Should translation
into French or other languages be required, arrangements need to be made well in advance. MILE has found that the optimal duration for its courses is over a period of three consecutive days. Longer periods out of the office may not be sustainable.

Overview of the Master Class

The eThekwini Municipality realised the need for a peer based learning intervention to support the emerging and changing needs of South African and sub Saharan municipalities. eThekwini Municipality has conceived its peer learning intervention under the auspices of the Municipal Institute of Learning (MILE), which they hope will position Durban as a Centre of Learning in South Africa and the African continent. MILE is structured along four learning ‘pillars’: Capacity Building, Strategic Partnerships and Networks, Collaborating with Academia and Municipal Technical Support. These programme ‘pillars’ are underpinned by an integrated knowledge management system. This course was developed by the eThekwini Water and Sanitation Department (EWS) and the focus of this course is on “Getting the Basics Right” with the aim of providing the participants with information and tools on how to manage water and sanitation challenges in rural and urban areas. The course is divided into a number of modules, each of which has sub-topics/sections and site visits or activities where applicable. Each module contains a mix of power point presentations, discussions and worked activities. The aim of the modules is to provide practical information to guide the participants in applying a similar approach in their own municipalities.
Course Aims

- To provide information on the basic requirements for an effective and sustainable water and sanitation programme
- To transfer the knowledge, information and lessons learnt from the eThekwini Water and Sanitation department’s experiences
- To impart the necessary tools to assist in improving the quality of life with respect to the supply of water and sanitation

Learning Outcomes

Participants on the course obtained an understanding of the following:

- How to meet the challenges of rural and peri-urban water and sanitation supply
- The aspects that need to be including when developing water and sanitation tariffs
- The importance of continuous education and awareness programmes and how these are applied by EWS
- How to identify water losses and corrective actions that can be taken
- The role of a well trained maintenance and operations team
- The use of GIS for storing information and how this is used in making decisions within a municipality
- The aspects that need to be considered when operating waste water treatment works
- The challenges they are going to meet and how these can be overcome
Module 1

The supply of basic water and sanitation services to rural settlements

This module focuses on the supply of basic services to the rural areas. It addresses aspects that need to be considered when determining which are the most suitable technologies to use to ensure water supply and sanitation services. EWS provides insight into how they developed the current systems that are used such as ground tanks and flow limiters for water supply, and urine diversion toilets for sanitation. Results of these initiatives are provided and lessons learnt during the process passed onto the participants. A site visit is arranged.

Module 2

The supply of basic water and sanitation services to peri-urban settlements

This module has similar aspects with MODULE 1, but with an emphasis on the peri-urban and urban informal settlements. The use of water dispensers and ablutions for these settlements is discussed. A site visit to view the ablutions is arranged.

Module 3

Non Revenue Water

Non revenue water has been identified as the second most important issue in EWS. The department has developed new initiatives to carry out water balances to identify the losses and many initiatives have been launched and planned to reduce the non revenue water. A description of how these water balances is
prepared and the actions taken to date (together with financial and other benefits) will be provided. Tips on where to start, how to overcome the problem and how to sustain the process are provided. A case study of the pressure reduction valve project is presented.

Module 4

Using GIS (Geographic Information System)

GIS is an important tool for supporting municipal operations and infrastructure management. This section will explain the basic requirements for establishing a GIS system. The costs and benefits are explained. A demonstration of the EWS system is given. A DVD on the process is shown.

Module 5

Treatment Works

There are 27 wastewater treatment works and 4 potable water treatment works in the eThekwini Municipal Area. An overview of the wastewater treatment process will be given. A discussion around the differences between large and small treatment works is provided. A site visit to a small wastewater treatment works is undertaken.

Module 6

Operations and Maintenance

This module will cover how EWS has developed sustainable operation and maintenance systems. The basic requirements for such systems will be explained which will cover aspects such as training, setting of key performance indicators, developing response plans and reporting. Case studies on how this
department contributes to ensuring sustainable water supply will also be presented

Module 7

Water policy

The water policy guides all actions taken by EWS in terms of providing water and sanitation services. This section will cover the main aspects of the policy document such as the water tariff, how to deal with non-payment, and the development and results of the EWS debt relief scheme. The manner in which this document is handled by EWS staff will also be covered.

Module 8

Education:

Education and community involvement are an essential part of the EWS function. Many initiatives are in place to ensure two way communications with all consumers such as the establishment of focus groups and the use of the Raising Citizens Voice system, both of which will be explained in this section. Participants will be provided with guidelines on how to approach communities and the most appropriate methods of interacting with consumers on water and sanitation issues. Lessons learnt and results of the various initiatives will be provided.

Module 9

Domestic tariff development

The module will cover, in detail, the development of domestic tariffs for water and sanitation. Aspects that will be discussed includes how the basic free water supply volume was determined, how the different levels of service were developed,
and the aspects that need to be taken into account when developing a water or sanitation tariff. The experience of the EWS in implementing these tariffs will also be discussed.

Module 10

Call centre

The EWS has developed a successful call centre that deals with complaints related to water and sanitation aspects throughout the EMA. Participants will be provided with information on how the centre was developed, its operation and the lessons learnt by EWS in establishing and managing the system. A visit to the call centre was undertaken.

![Image of a call centre with employees working at desks and computers.](image.png)
EWS Strategic Vision

Neil McLeod, the Head of the Water and sanitation Unit kicked off by advising participants that water and sanitation in eThekwini Municipality as a business is different. Generally, water is seen as a political issue in the sense that people have a right to access to water. Sanitation on the other side is not well understood. No one wants to talk or get involved in sanitation issues. The assets of rendering water and sanitation service often cannot be seen and yet they serve all the customers regardless of their economic status.

The municipality is facing a critical challenge with regards to a shortage of engineering staff and experienced senior management. In recent years, it has become difficult to retain and attract key staff. Another challenge is changing the staff demographics of the municipality to reflect the local population. Salaries and training budgets are also an issue because they are low and do not meet those applicable in world class businesses.

Amidst the challenges the EM plan and budgets on five year cycles. The Strategic planning approach used has moved from the traditional SWOT analyses towards risk management. According to Neil, risk management is becoming more important as a management tool. There are four approaches to managing risk (and they will not be discussed in detail in these LNs). They include treating, tolerating transferring or terminating the symptoms.

Over the years, the municipality has supported a number of municipalities. Over 80 municipalities in South Africa have no engineering staff and are using consultants. The use of consultants does not capacitate municipalities. Neil believes
that municipalities need people or companies who have operated water services utilities and can develop management systems and retain staff. This could be done using management contracts for private sector operators.

There are five key management issues, namely, asset management, new infrastructure and services, customer management, financial management, and human resources management. Human resource management must ensure that the municipality has competent key staff in place. They must ensure that Standard Operating Procedures are in place and are able to retain institutional memory and ensure effective training, talent management for succession planning and staff development. The municipal structure needs to be reviewed regularly and the organizational culture needs to be built and based on the values of integrity and excellence.

It is important for municipalities to maintain existing assets. Most water service utilities internationally (particularly in the developing world) spend over 90% of their capital budget on asset replacement. It is also important to know what assets exist and what their condition is. Non revenue water in the municipality has decreased from 42% in 1996 to 29%. This has been as a result of implementing a GIS system which has proved to be a valuable tool in monitoring non-revenue water.

eThekwini Municipality has extended basic water services to more than 1 million people in the past 10 years and basic sanitation to more than 500 000 people in the past 6 years. Although this involved installation of new infrastructure, infrastructure solutions have to be affordable and sustainable financially, environmentally and socially. Municipalities need to strike a balance between funding for new and existing assets. The development of new infrastructure needs to place job creation as an important aspect of service delivery.
The WSU’s call centre receives approximately 1.2 million calls a year. For poor customers that cannot afford to call or come to WSU offices, the municipality offers toll free numbers or contacts them via customer service agents that visit them. For staff members, the system that is used is easy to operate and less sophisticated and does not require technically skilled personnel.

In terms of financial management, the municipality has an annual income of approximately R5.2 billion. The accounts are audited and as a result, the municipality has an AA credit rating and the ability to attract loan finance. The capital expenditure and customers must be efficiently managed. Pricing is also highly important. Of course there are two views to pricing water. It could be viewed as a right to be made at no cost or as a commodity to be priced using market principles. The eThekwini Municipality has adopted a combination approach. The supply of basic water and sanitation is seen as a right whereas higher levels of service are priced using market principles. The capital cost of a basic service is not paid by a customer. The water price is set to cover debt costs, depreciation as well as operating and maintenance costs. The price paid for the use of a service increases with the level of service and with volume.

Lessons Learned

- Effective communication is vital to success in securing funding and getting projects implemented. Communication can make or break any initiative.

- Water and sanitation operation should be seen as business to be run according to normal business principles and the implementation of a strategic approach.

- Innovation is the key to growth and development of the municipality.

- The support of political leadership is critical for success.
Provision of Basic Services

Rural Water and Sanitation Programme

Teddy Gounden, a Manager responsible for Community Education and Councillor Liaison within the WSU took us through his presentation regarding the supply of basic water and sanitation services to rural settlements, and in particular urine diversion toilets. This programme was initiated in 2002 to aid in preventing outbreaks of cholera and other water borne diseases. During this time, there were sever backlogs with 175 households without adequate sanitation and 68 500 households without access to safe water. The municipality established a pilot project in uMzinyathi, an area south of Durban. Urine diversion toilets and yard tanks were chosen as most suitable systems for rural and peri-urban areas. They were funded through the Municipal Infrastructure Grant. EM is facing challenges of providing water and sanitation in rural areas.
These challenges relate to meeting MDG goals, the emptying of pits, the provision of water and sanitation in these areas (i.e. topographical challenges), and the existing backlogs are too high. These challenges apply to urban and peri-urban areas, particularly in informal settlements.

The Urine Diversion Technology allows the toilet to separate urine and faeces and this leads to the destruction of diseases causing pathogens in faecal matter through drying. Two vaults are used, the contents of one dry out while the second is in operation. Sand is used as cover material and the urine is diverted into soak pit. Vault contents are buried upon removal. Through national government funding, the municipality is able to provide the structure free of charge. The households are responsible for operation and maintenance.

The provision of waterborne sewerage is extremely costly due to topographical conditions in unserviced rural areas. Furthermore, the cost of emptying conventional VIPs is also unsustainable. Tankers cannot reach many pits due to terrain and densities, particularly in informal settlements. Desludging by tankers is also problematic due to solid matter, such as bricks, in pits. Manual emptying is also problematic as a result of the terrain and costs.

The delivery of water and sanitation to communities needs to be done as a package with education included. In the pilot project, each beneficiary household receives 300 litres of water a day alongside dry sanitation. Dry sanitation is advantageous because
it ensures safety on site disposal of human waste. There are no new pits required to be excavated when full. There is no need to move top structure when full because the waste decomposes before it gets exposed to surrounding soil. The decomposed contents are safe to handle when removing. The conventional VIP has a disadvantage because of the seepage of the raw sewage into surrounding soil/water table and the manual emptying of VIP poses health risks. As mentioned earlier, education and visits undertaken to each household are essential for a successful rollout.

Education can be undertaken using various methods, such as leaflets on emptying, street theatre productions in schools, shopping centres, taxi ranks and so on. The municipality employed facilitators from local communities and allowed them to be trained by institutional and social development (ISD) consultants. The monitoring of household understanding and practice of health and hygiene as well as the water and sanitation system was undertaken by many actors, namely, HSRC, PRG, UKZN, Community Health Workers, the WSU Education Division, and the City Health Department. The HRSC evaluates the effectiveness of education, acceptance by the community and the maintenance of the system. The Pollution Research Group and UKZN investigate the effect of pathogens and the use of dried faecal matter.
Community involvement is highly critical because they are the custodians and beneficiaries of the project. They are key for successful implementation. Prior to the implementation of the project, the municipality also needed to understand cultural issues and work closely with tribal authorities. Labour, for instance, was sourced from the local community. The programme has ensured the development of small scale independent contractors to provide emptying services, set up general hardware supply stores and provide general operation and maintenance services.

For operations and maintenance, the municipality adopted a caretaker approach to water and sanitation management. A caretaker manages 300 households; educates households about health, operations and maintenance; promotes services; provides advice when emptying; extends monitoring to O & M ownership; and finally reports to EWS.

**Lessons Learned**

- Different sectors need to collaborate in supplying rural water and sanitation.
- The supply of water and sanitation services should create economic opportunities.
- Ongoing education and awareness programmes are essential.
- Feedback and monitoring of progress is important.
- The centralization of the programme allows for cost savings and sustainability (quality).
- The implementation model must suit the needs of institution and be acceptable to the community.
- Ongoing independent monitoring allows for rapid response in securing back panels, adequate covers for vent pipes and the toilet seat for children.
Community buy in is important, many households are emptying their own vaults

A survey conducted recently shows that 28% refuse to empty but are prepared to pay.

The visit of the President and the Minister of Water Affairs increased acceptance.

**Peri-Urban/Urban Water and sanitation programme.**

The supply of basic of basic water and sanitation services to peri-urban settlements programme commenced in 2009 and the current budget is R375 million. It is anticipated that it will be completed in 2013. Initial speculation indicates that approximately 800 000 people will benefit from the project in informal settlements and is working in an additional four transit camps. The project strategy employed was to install new sewer and water links, including connections to existing infrastructure, to informal settlements. The infrastructure services temporary ablution blocks which are comprised of toilet and shower facilities. The ablution containers are placed on a platform which is built as part of the project. Approximately 318 informal settlements will benefit from the project. These
informal settlements have been identified for future formal housing development by the municipality.

The development programme uses a model called the AC Project 8 Emerging Sub-Contractors earmarked for working on the sanitation project. It is a small enterprise development programme and is a vital component of the project. Approximately 2470 mainly unskilled labourers have been employed to date. Project requirements are sourced from within the communities, where possible.

Currently, 218 ablution facilities have been installed on 109 sites throughout eThekwini. Caretakers and community liaison officers are being appointed to maintain the facilities. A further 61 sites with 112 facilities will be completed.

Lessons Learned

- The provision of waterborne sanitation reduces the health risks in crowded areas.

- Job creation is sourced from local communities. Stimulation of small business development can be achieved by utilization of local resources.

- Caretaker management is important to reduce vandalism and abuse. The provision of toilet paper and detergent prevents blockages.

- Ongoing maintenance is important.

- Shipping containers provide flexibility for relocation and are a cost effective solution.

- Education is essential
There is a need to be firm when dealing with the political process.

Containers reduce grey water accumulation around standpipes

Urban water and sanitation challenges

Non-Revenue Water

South Africa is a water scarce country. On average, non revenue water accounts in Africa for 58%. In South Africa, non revenue water is estimated at 34%, but many municipalities cannot perform water balances. Global warming is also a harsh reality and municipalities need to become more environmentally friendly. Municipalities need to develop projects in a manner that conserves resources and examine implications. The production and transportation of portable water and the disposal of waste water account for up to 20% of energy consumption. EThekwini Municipality has developed non-revenue 10 year projections with and without non revenue reduction intervention. They have developed non revenue strategic plan objectives.

The main drivers to reduce losses include AC Mains replacement, active leak detection, rezoning, improving reservoir integrity, illegal connection rectification, billing data integrity improvements and the improvement of meter accuracy. In order to maximize billed consumption, municipalities need to undertake assessments, optimize efficiency, minimize losses, plan for future interventions and ensure sustainability and programme implementation plan. The municipality has established new fault manager software to assist with analysis of faults data, pressure management, maintenance requirements, leak detection, overflows, and integrity as well as improve the speed and quality of repairs.
The municipality has set new standards for meter installations and a change out programme for older meters as well installing new ones for properties with existing buildings or electrical connections without a water connection. It has also been extended to government buildings with multiple connections and properties where connections were previously removed. These potential customers have given amnesty to correct this over a period of time.

The WSU has instituted a number of allied interventions to ensure an effective and efficient service. Asset and risk management has been implemented across the unit. Existing data has been updated and SOP as well as asset management plans have been developed. Performance management is being implemented up to a certain level of staff. Publicity and communication has been improved. All these initiatives have realize savings of R321m in the past financial years at a cost of R152.6m.

Lessons Learned

- Buy in from management and the recognition that the reduction of non revenue water is a key strategic initiative.

- In order for any non revenue reduction intervention to be successful, the entire municipality must fully support all aspects of loss management and provide a coordinated effort to reduce all non revenue water.

- Customer education is equally important. Unless the customers accept and subscribe to policies, removal of illegal connections and penalties are inevitable.

- Asset management is a critical factor.

- The modern engineer must be concerned with life cycle costing.
Qualified staff is the biggest asset of the municipality and must be recruited and remunerated and retained.

Stricter policy and enforcement enable the municipality to improve performance.

The lowering of the design pressures is having a great impact in non revenue water, bursts and pipeline life.

**Introduction to Geographical Information Systems (GIS) Process: GIS for Water Utilities DVD**

See: [www.awwa.org](http://www.awwa.org)

This DVD shows uses and benefits of geographic information systems (GIS) in water utility operations. It shows that many water utilities are still referencing asset information geographically. Some utilities have converted their paper maps to electronic formats so they can be used by a GIS -- a powerful computer-based information management system designed to work with data referenced by geographic coordinates. A GIS allows utility operators and managers to determine where their assets are located—for example, the location of valves, water mains, hydrants, and meters. A GIS also lets users update, analyze, and display information about those assets. As a result, a GIS can reveal important information that leads to better decision making. The DVD is published by the American Water Works Association. Order the DVD and enjoy.

**Overview of the Waste Water Treatment Process**

It is well known that dense populations create more waste than the environment can manage its own. However, municipalities need to comply with legislation, prevent disease, maintain aesthetics and protect the environment at the same time. In doing so, the eThekwini Municipality wastewater treatment plants simulate the natural environment process that occurs in the environment. The typical treatment process occurs in
phases, namely, preliminary, primary, secondary, tertiary, disinfection and residuals treatment. The head works treatment processes remove large objects, rags, plastics, sand or grit from the waste waters through the processes of coarse screening and degritting. Coarse screening involves removing large objects, rags, plastics and so on, while allowing organics to pass through using bar racks and bar (manual and automatic) screens. Grit removal involves removing sand, fine glass, plastics, metal and so on, using grit channels and air lift degriters.

The primary treatment processes involve removing settleable organic matter from the screen raw sewage and storing in the Dortmand, Circular Settling and Rectangular Settling tanks. The settling tanks. The settling tanks consist of a distribution chamber, inlet, and raw sludge outlet, scrapers, and scum trough, bridge and scum board. The secondary treatment process involves a biological treatment process that removes the majority of organics from the sewage and binds inorganic into flocs through bio filters and activated sludge systems. A
Clarifier consists of a sludge outlet chamber, inlet pipe, sludge outlet pipe, sludge siphon pipe, clarifier bridge, tank balancing valve and sludge scraper. The tertiary treatment process involves polishing effluent and includes maturation ponds/rivers, sand filters, activated carbon filters, and micro straining/membrane filtration. During disinfection, residual pathogens (viruses and bacteria) that could pose a threat to human health are killed through chlorination, ozonation and UV. Residuals treatment involves detritus, primary sludge and waste activated sludge. Grit and screenings are called detritus and are commonly disposed at a landfill or buried on site. Sludge coming from the primary sludge tank is usually thickened and then digested aerobically. Sludge coming from the clarifiers is thickened by dissolved air flotation and then digested aerobically. And finally, some sludge is used for composting.

Operations and Customer Services

Operations and Maintenance

The WSU is responsible for maintaining water and sanitation services infrastructure. The key requirement for achieving this is trained staff, set procedures and monitoring systems. It is also important to work closely with the education department within WSU. To establish a maintenance programme, municipalities need to undertake the following:

- Identify the number of consumers
- Identify the level of service
- Develop an organogram of staff requirements
- Develop a job description for each person
- Establish a reliable reporting system
O & M includes general and planned maintenance. General maintenance encompasses activities such as spraying of weed killers along fence lines, clearing bushes and cutting grass on trunk water mains; installing new fencing and gates to reservoir sites; and repairing and patching vandalised fencing. When undertaking planned maintenance, WSU divides the municipal area into zones (i.e. 22) for bulk infrastructure maintenance. One team is dedicated to each zone. Emergency situations take preference over planned maintenance. Standby teams are called during emergencies. Teams engage with a particular site, complete all maintenance and move onto next site in each zone.

Planned maintenance includes reservoirs, trunk lines and shut downs. Currently, the eThekwini Municipality has been subsectionalised into three regions, namely, north, west and south regions. The zones fit into the region. There are nine teams per region and each team is comprised of a supervisor and general workers. Each team is responsible for the complete maintenance of one reservoir zone which may in turn comprise 20 to 30 water storage facilities. There are approximately 22 000 km of gravity and trunk water pipelines in the system. Each team is comprised of a supervisor, operators and general workers. The team is responsible for the complete brush cutting and brush clearing of servitudes of trunk mains. They average between 400 and 600 metres per day. A quick calculation will determine that the average turn around cycle between segments of trunk mains are 12 to 14 months. Planned shut downs are undertaken to repair valves and pipes. Umgeni Water and customers are informed accordingly when shut downs occur. There are emergency procedures in place and reservoirs are monitored daily on a 24 hour. When alarms are triggered, the municipality employs certain procedures depending on the scenario. The call centre is kept updated of progress. As mentioned earlier, there are five operational areas comprising of engineers, technicians, supervisors, plumbers, general workers and so on. WSU has also employed permanent and contract plumbers. Operational plumbers undertake smaller repairs
which are managed through the control room. If repairs are not undertaken within 24 hours, the problem is escalated to a higher authority. Water service providers are advised to have a service level standard that must be met at all times. Matters must be resolved in a set period of time. All staff must be monitored against a KPI and evaluations must be carried out every six months to monitor progress. Staff members should be provided with specific training courses to enhance their performance at work and are able to meet their KPIs. As part of operations and maintenance, there are many responsibilities that need to be undertaken, such as, leak traces based on non revenue water information. The WSU also uses camera investigations to determine the integrity of the pipes; valves to throttle the system; and shutting reservoir valves at night.

**Water Policy Development and Application**

The eThekwini Municipality developed a water policy that covers aspects related to water services and describes how policy must be applied. The policy has been developed over the years based on experiences in delivering water services.

Noticeably, there are different tariffs for different users and levels of service, for example, full pressure, semi pressure (roof tank) and ground tank. Connection charges are based on the type of connection. It is important to match water supply system to sewage system. The policy covers water accounts. Water accounts can be raised through, estimates, high accounts as a result of incorrect readings, faulty water metres, water leaks and high water use. Incorrect reading can be adjusted when realized; faulty water metres can be tested and account adjusted if inaccurate; in the case of water leaks, customers must repair leaks and pay for water used; and high water use is investigated.
The policy also deals with accounts that are in arrears (i.e. not paid in full by due date). Interest and administration charges are raised on outstanding amounts and the notice is printed on the account. A letter is sent to the customer, and if there is no response, water supply is restricted. If a customer uses less than 9kl/month and does not pay for extra, the service is disconnected. The disconnection policy allows for the flow limiter or restrictors installed where water is not paid for 60 days or the debt in greater than R110.00. If the flow limiter is tampered with, then the complete connection is removed. In cases where connections are completely removed, standpipes are installed. If a customer wishes to restore water supply after the connection has been removed, they must sign an admission of guilt and adhere to minimum payment conditions that are based on the customer’s income.

The flow limiter is a device that was introduced to limit daily water consumption. Voluntary installation can also be applied to assist customers with consumption management. Punitive measures are applied when arrears are not paid. Basic water supply is guaranteed for indigent customers. With regards to the flow limiter and the signed acknowledgement of debt, customers are obliged to attend a 15 minute training “course”. During the training activity, awareness is created on how to manage free basic water; that tampering and not reporting flows greater than free basic water will result in full disconnection until all amounts owing have been paid. Interest is accrued on previously “frozen” debts. The flow limiter is removed when all outstanding debt has been paid in full.

The water policy has been developed with a “win win” outcome for both the municipality and the customer. The municipality’s intention is to change the mindset of the community, encourage payment and help customers as far as possible. Furthermore, the intention is to encourage political acceptance and buy in as well as education and awareness. The policy stipulates that in order to qualify for a debt relief scheme, the customer must
have a property rateable value of less than R190 000 and should be 90 days in arrears. These arrears are “parked” in a suspense account and there are no penalties or interest raised. Failure to pay will result in time added to write off period. Failure to pay for four consecutive months, the agreement is cancelled.

Customers can choose to stay on the normal supply or they can apply for a flow limiter. The flow limiter ensures that the customers have a nil account end the month. On twentieth of the debt is written off and if tempering is detected, the contract is terminated and becomes payable in full. The debt relief scheme has resulted in water consumption being significantly reduced. Customers continue as regular payers and the initiative distinguishes between those that can and those that cannot pay. The ultimate achievement is improved relationships between the municipality and the citizens. However, there are challenges that have been encountered. Many defaulters have converted to the flow limiter. Poor households with large families cannot survive with 300 litres free limit offered when you have converted to a flow limiter.

All illegal connections that have been found are removed. An amnesty policy was introduced in 2010 to target illegal connections. There was evidence that there are groups of people who are encouraging consumers to connect illegally for a fee. Illegal connections are unsustainable and if not reported need to be removed and standpipes installed. The Illegal Connection Amnesty policy allows three months amnesty to domestic customers with illegal connections and bypassing of metres. It allows an opportunity to reinstate connections in cases where the metre has been removed completely). When this policy was initiated, specific wards were targeted for the three month period allocated. The Amnesty programme was advertised widely and through the local ward Councillors. The consumers were allowed to come forward and disclose the location of the illegal connection, complete forms, pay tariff rectification fees (i.e.R250.00) and pay the normal water deposit.
When the three month expiry period expired, punitive measures were instituted. All illegal connections were removed and consumers benefiting from illegal use of water prosecuted. Furthermore, three years of estimated consumption is charged to account. Illegal connections at standpipes are also disconnected and removed. To date, there have been successes whereby people have signed up voluntarily and the municipality has recovered money owed.

Community Service Agents were introduced in 2005. At least 25000 customers with a combined arrears of R20 million were identified. This debt situation was seen as highly unsustainable. The objective of the CSA initiative was also to improve payment levels; reduce leaks and high consumption; improve customer satisfaction with service provision; and offer solutions to customers (e.g. installing the flow limiter). CSAs were selected and trained. The Councillors affected were consulted extensively. Education leaflets were distributed widely and the customers were targeted using a database. The CSA visit homes and establish a customer’s billing history, assess reasons for not paying, and provide options and record faults.

The CSA initiative has also had achievements, particularly in the reduction in water consumption and savings. Customers visited made cash payments, visited a EWS office and felt that CSAs had given them a good understanding of water issues. The development of the CSA learning programme has resulted in the establishment of an accredited National Certificate in Community Water, Health and Sanitation.

**Tariff Development**

The Treasury Office is responsible for the normal processes of budgeting, billing and setting of tariffs within the municipality. Thanks to technology, WSU is now able to remotely develop its own water and sanitation account and tariff system.
The Free Basic Water initiative became effective in July 2001 following a call from the national Department of Water Affairs. Municipalities were required to provide 6 kl/month to every household for free. The initiative was primarily aimed at poorer households. Local authorities were given responsibility to roll out this programme in their respective areas. Subsequently, the eThekwini Municipality extended this call and provided 9kl/month to every household. In cases where the municipality could not provide water metres, ground tanks, standpipes and mains were installed across all areas. As a result of apartheid planning, it is difficult to manage if the programme is rolled out to poor households only.

There are a number of aspects to take into account in tariff development. For example, municipalities need to consider the type of customer, level of service, cost of bulk water, volume of water required, operational and capital costs, other income, provision of free basic water; and the encouragement of water conservation. Basically, there are two types of consumers, namely, domestic (residential) and non-domestic (industrial, commercial, government etc.). The level of service for the two types of consumers is not the same. It varies from semi-pressure to full pressure or ground tanks. Likewise, the water tariffs are not the same. Fixed charges depend on the size of the metre connections and the level of service. However, there are no fixed charge for residential properties less than R190 000.00 and consumer who are on a semi pressure system. In terms of consumption charges, domestic consumers pay a unit charge based on volume used, whilst non domestic pay a flat unit charge regardless of volume used. All other uses pay R9.98 per kilolitre, but the monthly fixed charge is still based on the size of the connection.

The sewerage tariff for domestic use was introduced in July 2001. Previously, the charge was raised as part of rates and was based on the property value. The problem with this system was that,
in high value properties, fewer people lived in them whereas many people lived in low value property. As a result of this, this system proved not to be sustainable for the municipality. It was therefore changed and new system introduced that ensured that tariffs were raised based on the volume of water used and that a fixed charge is also raised provided the property is connected with a sewer line. All other users pay R4.49 per kl and a monthly fixed charge based on the size of the connection. There are also additional trade effluent charges. As mentioned earlier, there were different levels of services developed and decided upon, as well as benefits for implementing the system.

Water connection costs also depend on the level of service provided and the size of the metre installation. In raising capital and operating costs, municipalities need to consider a number of aspects which may include: salaries and allowances, general expenses, maintenance and repairs, contributions to provisions, interest and depreciation. Tariffs are reviewed in July each year. The municipality negotiates with Umgeni Water to keep water costs to a minimum (10% maximum) based on future requirements and growth.

**Lessons Learned**

- Water conservation will result in savings in water and sewage charges.
- No more “rich subsidizing the poor”. It may result in an increase in illegal connections.
- Education and awareness is important.

There are many “stories” that can be told by the municipality about the tariff implementation process from which
municipalities can draw experiences. Municipalities can compare themselves and can draw templates use by the eThekwini Municipality, such as water tariff calculation sheets, charges, sewage disposal tariffs' sundry water tariff charges and sundry sewage disposal tariff charges.

**Education and Community Involvement**

Education and community involvement is essential for the successful rollout of all the initiatives mentioned in this learning note. These include, the introduction of flow limiters, debt relief scheme, illegal connections amnesty programme, school education, operations and maintenance, and the rollout of ablution blocks, urine diversion toilets and VIPs. The municipality has employed a number of tools to undertake education activities, such as, posters and leaflets, road shows, home visits, school interventions and teacher programmes, education at clinics, competitions as well as street theatre. Since 1990, EWS has developed and implemented a number of community programmes. It is important to note that education compliments other initiatives.

The focus of the education programme has been schools and the community at large, the professional development of educator; monitoring and evaluation; and research. Education has been provided to households during the installation of urine diversion toilet system, for example. School focused and professional development for educators programme has been the main focus. The programme also ensures that there is an intensive engagement with each and every household through training community members as facilitators to do at least 5 visits per household which includes one pre-visit. The households are provided with education material on water and sanitation. In addition to this, community and focused group meetings are held and street theatre is used as a means of educating the community.
With regards to the School Sanitation Hygiene Education Programme, workshops are help with every school within a project area. Resource materials are provided to support any existing opportunities and avenues available for sanitation hygiene education within the National Curriculum. The programme has seen the empowerment of learners and educators from different schools through workshops. The Professional Development Programme was conceptualized in 2004 and a Schools and Sustainability course was introduce. This is a part time course offering an intensive one year professional development programme in environmental education for educators. It offers a resource and workplace based approach to learning. It is also accredited as a short course by a university. To obtain university accreditation, a minimum (3) number of modules had to be selected. The modules included water, sanitation and hygiene education; waste; energy; and air pollution. Water, sanitation and health education was a compulsory module as a result of the bursary conditions stipulated.

Water, sanitation and health education was integrated using a holistic environmental approach. The professional development of educators had incentives. They received subsidized tuition fees covered by the eThekwini Municipality; a university accredited for the module; a contribution to the department of education’s professional development point system; and a continuous support from eThekwini Municipality resource and network database.

**Lessons Learned**

- Education compliments other initiatives.

- Education interventions need to be planned carefully because they can lead or facilitate positive sanitation, health and hygiene behaviour change.
There is a need for ongoing education programmes.

A challenge of linking local economic development to sanitation, health and hygiene is that the key message of improved health becomes secondary to economic development.

Education on sanitation, health and hygiene needs to go hand in hand with an operations maintenance component to ensure that learning goes beyond the classroom and has real health benefits.

Monitoring and evaluation is more effective as a developmental process.

In addition to the Education Programme, the eThekwini Municipality embarked on a programme aimed at “Raising Citizens Voice”(s) with the intention of empowering the communities. In South Africa, there is a legislative imperative aimed at encouraging service users. In line with this programme, the municipality developed the Participatory Citizen Training Programme that covered nine topics, that include, basic legislation, different spheres of government, understanding the water cycle, the life cycle of water, using water wisely, health, hygiene and sanitation, pollution abatement and water quality, tariffs billing and affordability and regulation (monitoring and evaluation). Participants in this programme receive a certificate of completion.

Participants represented civic organizations from the eThekwini Municipality’s zonal structures. The participant’s nomination process was coordinated by zonal leaders. Initially, the invitation to the training programme was extended to the zonal structures through presentations by EWS officials. Upon reaching agreements on dates and venues, the zones were grouped into two day training sessions over weekends.
at central venues. The participants are given an opportunity to evaluate the programme at the end of each training event. The received feedback suggested that the programme was indeed empowering. The programme ensures that participants are in a better position to exercise their responsibilities by engaging EWS on issues of service delivery from an informed position. Post training is also offered and community leaders are also invited to be part of user platforms. Information and knowledge accumulated in these training sessions is cascaded to citizens through more meetings and fora.

Customer focused groups are formed to enable an enhanced implementation of the water policy. Normally, they are not aligned to any political group or NGO. EWS interacts with these groups to obtain information on how services can be improved. For example, such interactions led to introduction of free basic water supply that was increased from 200 to 300 litres per day. Currently there are nine focus groups across all areas and types of services.

**Call Centre Development and Operation**

The eThekwini Municipality has a mandate of responding positively to the needs of its citizens. There is a set of three guidelines that govern its operation of attempting to achieve this, namely, the Customer Care Policy, Batho Pele Principles and service Level Standards. The Customer care Policy is about “getting it right the first time” is the experience whenever customers do business with the municipality. Batho Pele (People First) Principles emphasizes the values of “customer first”. Service Level Standards are about improving relations and understanding between the municipality and the customers who make use of the services.

The core function of the call centre is to provide an outstanding customer experience; identify the reason for calls; offer a high level of service; ensure that wait/hold times are kept short; ensure
that calls are handled quickly and efficiently to favourable resolution; and is accessible 24 hours 7 days a week. The centre comprises of the Call Centre Manager, an Administrator, Supervisors, Trainers, Coaches, Customer Liaison Officers, and Agents working three hours shifts. The call centre is not only bound to undertake water and sanitation duties only but rather has been extended to consider other queries such as roads, storm water, traffic signals, ETA (Public Transport), various development projects, the Presidential Hotline and DWAF related.

Agents adhere to a work flow. The Agent is the first port of entry via a phone call, sms, mxit, e-services and fax. The Agent defines the customer report and asks probing questions. They capture the report on the relevant primary clipboard against a batch of fault codes. A reference number is then issued to the customer in cases s/he wants to make a follow up on the reported case. The call handling time should not exceed 2.5 minutes, and 5 minutes for complex calls. Billing calls should not exceed 3 to 5 minutes. The municipality is currently receiving 2800 to 3200 per day which amounts to about 70 000 to 90 000 calls per month. Electronic reporting on the other side amounts to 3000 per month. The municipality is still developing outbound statistics.

**Conclusion**

It is hoped that these learning notes will go a long way is assisting municipalities on how to address the challenges of rural water and sanitation; develop water and sanitation tariffs; the importance of education and awareness programmes; how to identify and reduce water losses; the importance of maintenance and operational procedures; the use of geographical information systems (GIS); and an understanding of operating a wastewater treatment works.