

Critical analysis of the legal compliance requirements of wastewater management within environmental legislation in the municipal sphere

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ABSTRACT

The state and performance of municipal wastewater treatment works in South Africa has been cause of national concern for many years, with many commentators, including the Department of Water and Sanitation, expressing their concern openly. It is no secret that wastewater treatment works in most municipalities are in a state of regression, further compounded by the fact that many plants are operating above their design capacity. The poor state of municipal wastewater treatment works inevitably leads to overloading of plants operating above design capacity ultimately leading to spillages.

The consequent impacts are well documented and range from a deterioration in the quality and usability of the national water resource and in some instances loss of life. Spillages also occur from certain wastewater treatment works sometimes for extended periods of time, or otherwise once off. However, whether the pollution has resulted from prolonged or from a once off spillage, the consequences remain dire.

Much attention has been given to the state of municipal wastewater treatment works and their impacts on the national water resource. However, the consequences for and liability to municipal officials responsible for the management, maintenance and operation of plants not complying to relevant environmental legislation are generally not commented on. The protection of the environment is entrenched in Section 24 the Bill of Rights in the Constitution of the Republic of South Africa, while the National Environmental Management Act, No. 107 of 1998 (NEMA) is the primary statute which gives effect to Section 24 of the Constitution. NEMA furthermore provide the basis for Specific Environmental Management Acts (SEMA), in this case the National Water Act and Waste Act, which governs activities that may adversely affect specific aspects of the environment.

NEMA requires all organs of state to comply with a number of national environmental management principles, which include the principle of Duty of Care. NEMA not only requires responsible persons to act to control incidents adversely affecting the environment and emergency incidents, but also provide for the prosecution of liable natural and/or juristic persons who has committed an offence in terms of this Act. This paper takes a closer look at the legal requirements related to the operation and maintenance of municipal wastewater treatment works, including duties and liability of the persons responsible for management and control of these works.

INTRODUCTION

The state and performance of municipal wastewater treatment works in South Africa has been cause of national concern for many years. Taking cognisance of this concern, the Department of Water and Sanitation (DWS) published the

National Water and Sanitation Master Plan (NW&SMP) in 2018, in which it assessed the critical challenges and priorities that required action by the water sector and defined all actions and interventions identified within the NW&SMP into annual measurable outcomes inclusive of roles and responsibilities, time frames and associated estimated costs. The NW&SMP therefore represents an action plan that must be implemented to overcome the challenges in the water and wastewater sector. Selective drivers from the NW&SMP encompass as follows:

- Water Quality Management – Policies, Legislation and Strategies
- Grey areas in responsibility and accountability
- Institutional arrangements are fragmented among a large number of water boards, catchment management agencies and municipalities.
- Poor alignment of policies and strategies between various government departments and spheres of government
- Lack of policy and legislative integration between DWS, DAFF and the Department of Mineral Resources
- Inadequate maintenance and control of effluent from wastewater treatment by Municipalities.

According to statistics provided in the NW&SMP (Department of Water and Sanitation 2018), approximately 56% of the over 1 150 Wastewater Treatment Works (WwTW) are in a poor or critical condition and in need of urgent rehabilitation. In 2006, Snyman et al. undertook a national survey evaluating 51 wastewater treatment plants of different sizes and using different treatment technologies in order to understand the extent of the challenges facing WwTWs in South Africa. The survey concluded that the majority of micro, small and medium size wastewater treatment plants in South Africa do not comply with the regulatory standards. In fact, Snyman et al. concluded that if the DWS's general requirement that a 95 percentile compliance with the conditions stipulated in every plants Environmental Authorisation (EA), licence or permits are strictly enforced, only 4% of the surveyed plants are adequately operated and maintained (Snyman et al. 2006). The South African Water Caucus (SAWC) recently launched its Report (published on the FSE website on 3 May 2018) on the State of the Department of Water and Sanitation. The Foundation of Sustainable Environment (FSE) is part of the network of the SAWC and contributed to the Report. In brief, the central challenges facing the department, outlined in the report, relate to the following:

- Considerable policy and legislative uncertainty related to *inter alia* the proposed Water Master Plan, proposed Water and Sanitation Bill and the proposed National Water Resources and Services and Sanitation Strategy;
- Deterioration in wastewater treatment works and infrastructure due to lack of maintenance and investment, with initial findings of the 2014 Green Drop report indicating that 212 wastewater treatment plants fall within a "Critical Risk" categorisation. These plants pose serious risks of untreated sewage entering rivers, streams and dams. This has dire impacts on water quality and human health including enhancing the spread of *E.coli* in the water resources and infections such as hepatitis A and diarrhoea;
- Significant deficiencies in compliance monitoring and enforcement.

Key challenges plaguing the sustainable management and operation of WwTWs across municipalities in South Africa include limitations in the availability of trained and competent process controllers, skilled maintenance crews, the lack of technical skills and institutional capacity, the lack in maintenance of aging infrastructure, and capital funding limitations and cutbacks. Maintenance challenges are further compounded as the national infrastructure grant funding mechanisms incentivise the building of new infrastructure, rather than the maintenance of existing infrastructure (Department of Water and Sanitation 2018, Snyman et al. 2006). In addition, the nature of internal decision-making systems and procedures in municipalities also often make it difficult for responsible managers to respond effectively to the need to provide reliable wastewater treatment services. These systems are informed, *inter alia*, by the Municipal Financial Management Act (MFMA) and the Municipal Systems Act (Department of Water and Sanitation 2018, Snyman et al. 2006). It is, however, worth noting that despite the challenges faced by a large proportion of WwTW operators and managers, many WwTWs are well managed, especially in larger municipalities and metros.

Despite the fact that the composition of various industrial and domestic wastewaters, and its physical, biological and chemical characteristics, differ considerably depending on the origin of the wastewater (Bwapwa 2019 and references cited therein), the consequences of poor wastewater treatment management could have significant implications for the environment and public health. Wastewater spillages, for example, contribute suspended solids to aquatic ecosystems, resultantly impeding proper respiration in benthic and watercolumn fauna and flora (Bwapwa 2019, and references cited within). Furthermore, decomposition of proteins and nutrients in aquatic ecosystems result in the release of ammonia, which has constantly shown to be extremely toxic to aquatic organisms, as well as the depletion of dissolved oxygen, which in extreme cases results in mass fish kills and mortality in aquatic life (Bwapwa 2019, and references cited therein).

Perhaps the most concerning aspect of the impact of poor wastewater treatment and infrastructure management is the impact on public health. Water sources contaminated with wastewater poses a significant risk to the health of humans, especially from both bacterial and viral infections contracted from a contaminated water source. Gastrointestinal problems are the most common ailment associated with wastewater contaminated water sources, especially in water sources with high coliform counts (Igbinosa et al. 2011). In extreme cases wastewater contamination can result in human mortality. A striking example of this was the tragic deaths of three infants from severe diarrhoea in the town of Bloemhof, Northwest in 2014. The cause of these deaths was believed to be the result of sewage contamination of the municipality's water supply, due to a broken sewage pipe (Centre for Environmental Rights Media Release, 4 June 2014). This incident was extensively covered in the media and attracted much attention from government bodies, civil rights groups and the affected communities, many of whom were calling for the responsible parties to be brought to justice.

In the aftermath of this tragedy, the Centre for Environmental Right (CER), amongst other civil and environmental right groups, lobbied the SAPS Provincial Commissioner to commence an urgent investigation into possible criminal prosecution of the parties involved. CER further called for the Northwest Provincial Director of Public Prosecutions to assist the SAPS Provincial Commissioner in finalising a criminal docket for prosecution (Centre for Environmental Rights Media Release, 4 June 2014). In considering the potential liability to stakeholders involved in the incident, CER stated in its media release that *"the investigation considers the potential criminal liability of the Municipal Manager, the contractor allegedly engaged to fix the broken sewage pipe, any municipal employees whose responsibility it was to oversee the work of the contractor,*

and any party who had a legal duty to notify residents of proper measures to be taken to avoid becoming ill".

Considering the large number of poorly performing wastewater treatment works in South African municipalities, as well as the inherent risk of sewage spills and pollution of water resources, it has become paramount that the respective managers in control of such works, and municipal officials and persons performing designated duties associated with such plants understand the risks, liabilities and potential consequences of acting negligently, failing to perform their duties in a responsible manner, or failing to act or exercise the necessary duty of care. This paper provides some insights into some of the legal requirements, duties and liabilities to parties performing a function associated with the management and operation of a municipal wastewater treatment work, including some recommendations and best practice principles to manage risks associated with the management and operation of a municipal WwTW.

WWTW INFRASTRUCTURE

Environmental risks associated with the management and operation of a municipal WwTW are inherently linked to the WwTW infrastructure, and subsequently the operation and management of such. Therefore, in order to understand associated environmental risks, the basic infrastructure layout of a typical WwTW must be considered. A typical wastewater treatment process employed in many WwTWs in South Africa is represented by the biological nutrient removal activated sludge (BNRAS) wastewater treatment process. Infrastructure associated with the BNRAS treatment process include:

1. Head of Works including screening and degritting infrastructure
2. Primary Sedimentation Tanks
3. Balancing Tanks for flow and load balancing
4. BNRAS Reactor
5. Secondary Clarifiers
6. Chlorine Disinfection Tanks
7. Waste Activated Sludge (WAS) Thickeners
8. Anaerobic Digestors
9. Digested Sludge Dewatering by Belt Filter Presses (BFP's)
10. Lime Dosing Installation to treat Sludge Liquors
11. Sludge Drying / Composting beds

The BNRAS treatment process include two distinct processes: a Liquid Stream Treatment Process (Figure 1: Liquid Stream Treatment Process Flow Diagram) and a Sludge and Bio Solids Stream Treatment Process (Figure 2: Sludge and Bio Solids Stream Treatment Process Flow Diagram). The liquid stream treatment process represent a base case treatment process for the main liquid stream based on preliminary treatment, primary sedimentation, biological nutrient removal, secondary sedimentation and disinfection, while the sludge and bio solids stream treatment process deal with the waste sludge and scum streams produced by the mainstream liquid treatment process. The sludge and bio solids stream treatment process involve anaerobic digestion, digested sludge dewatering, lime dosing of dewatered liquors, and sludge drying / composting. A 3-dimensional drawing showing the proximity of a BNRAS WwTW to a watercourse is shown in Figure 3. WwTWs are, more often than not, located in close proximity to a watercourse due to the need to release appropriately treated effluent back into a natural watercourse. Proximity to a watercourse however increase the risk of untreated or partially treated sewage spilling into the nearby watercourse.

Mechanical infrastructure, such as pumps, that are poorly maintained pose a severe risk to overflowing of linked sumps and ultimately gravitating as surface flow to nearby watercourses. Routine surveillance of the key identified infrastructure within the WwTW is therefore critical as minor incidences such as blocked pipelines can lead to dire consequences like overflowing of upstream manholes, and due to the topography of most WwTWs, gravitate overland to the nearest watercourse.

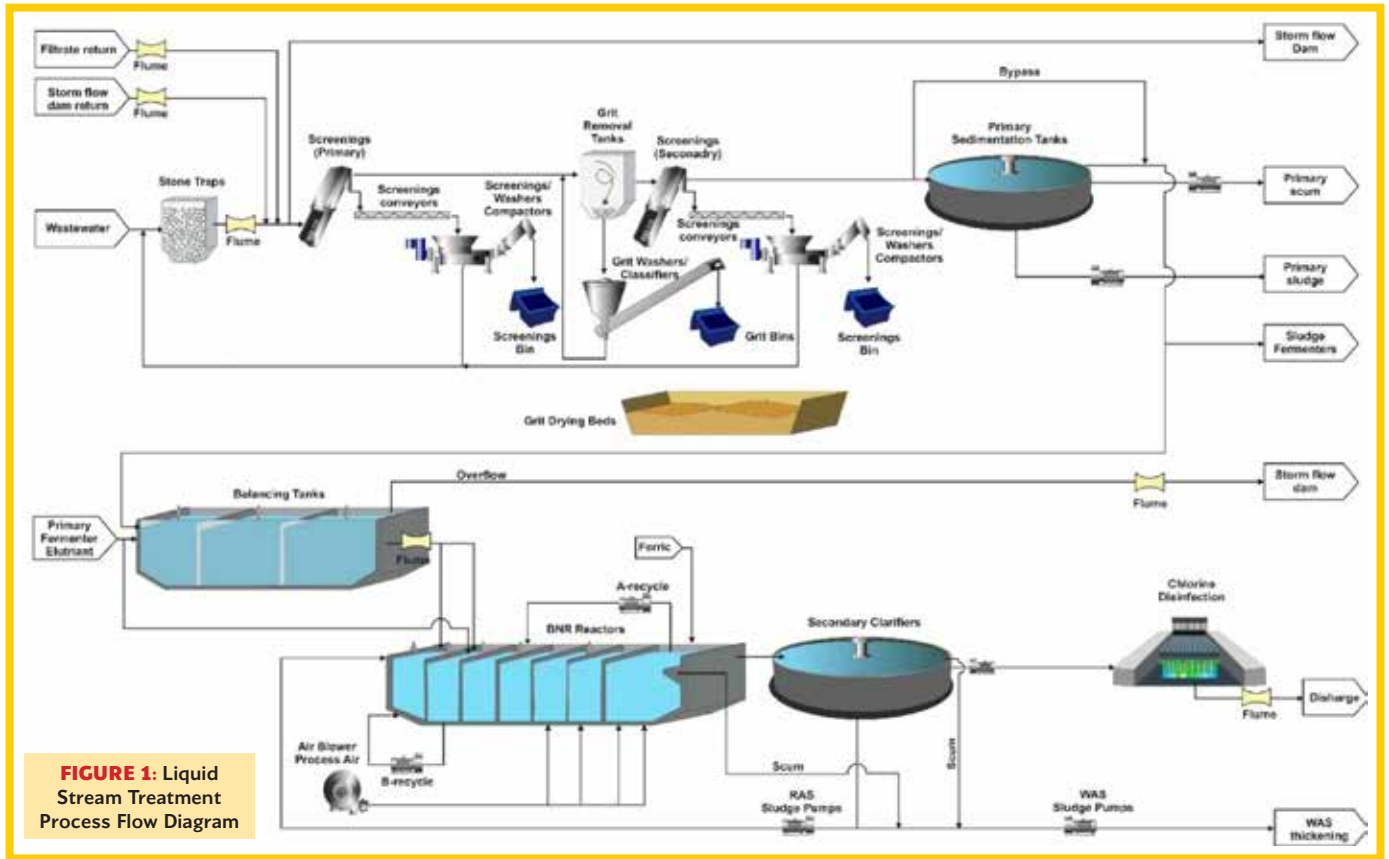


FIGURE 1: Liquid Stream Treatment Process Flow Diagram

One the other hand, flooding of the nearby watercourse may also increase the risk of spillages from the WwTW due to the close proximity of the WwTW infrastructure to the watercourse. The impact of flooding, and resultant pollution of downstream watercourses, are of greater concern in older plants that still operate, or have waste management infrastructure, such as historic unlined sludge drying beds, within the confines of the WwTW.

Some risks to the surrounding environment are in some cases associated with the design criteria of WwTWs. In order to minimise capital, operating and maintenance costs related to WwTWs, most treatment units are designed to handle the Average Dry Weather Flows (ADWF), which means that Peak Dry Weather Flow (PDWF) entering the WwTW may pose a risk of spillage if not appropriately managed. Provision therefore must be made to balance the PDWF by capturing it in appropriately lined dams and slowly releasing it into the plant treatment processes. Accordingly, Peak Wet Weather Flow (PWWF) need to be handled in a similar manner. This prevents seasonal spillages during wet months.

IMPACTS AND RISKS ASSOCIATED WITH WWTWS

Risks and potential impacts associated with the operation of an existing WwTW mainly include the potential contamination of surface and groundwater resources resulting from the release of effluent not conforming to the specified discharge standard, or spillage of untreated or partially treated sewage directly into a watercourse. These impacts can inadvertently result in a number of secondary impacts such as the deterioration of downstream water quality, adverse impacts on aquatic fauna and flora, impacts on wetland functioning and adverse impacts on human health that in extreme cases can result in human mortality such as the infant deaths in Bloemhof on 2014. Other impacts include the risk of sedimentation and erosion of the watercourse, especially where the release of spillage enter the watercourse.

In instances where upgrading of deteriorating or defunct wastewater treatment infrastructure is commissioned, additional impacts must be considered

and managed. These include impacts related to physical disturbance such as undertaking construction activities within a watercourse, associated riparian zone or wetland, within 32m of a watercourse or within 500m of a wetland. Construction activities could also result in potential contamination of surface or groundwater resources, which could include contamination resulting from hydrocarbon spills or inappropriate handling of cement or concrete during construction. These activities have the potential to severely impact the health and functioning of potentially impacted wetlands or watercourses, which in turn may result in further secondary impacts on biota inhabiting these ecosystems.

SOUTH AFRICAN LEGISLATION IN RESPECT OF MUNICIPAL WWTWS

Acknowledging the fact that South Africa is a water-scarce country, economic and social development in South Africa is perilously dependent on an acceptable quality of our limited water resources. Water demand will increase as South Africa develops economically and its population increases. This purpose of this section is not to critically analyse the relevant legislation but to succinctly demonstrate that South African law is not deficient in providing for appropriate measures to ensure that municipal wastewater treatment works are compliant, albeit that this law in instances are complex to interpret and tends to overlap inter-departmentally and institutionally.

Broadly speaking, insufficient environmental enforcement could be singled out as the dominant contributor to South Africa's deteriorating water quality also in the context of the performance of municipal WwTWs.

As will be seen from the brief overview on the relevant legislation pertaining to municipal WwTWs, a spectrum of legal instruments is available for enforcement. These instruments, if fittingly implemented, can instil a new compliance culture to create the necessary impetus, even if embryonic in the beginning, towards improved compliance levels and reduced risks to water users.

These instruments can be broadly summarised as:

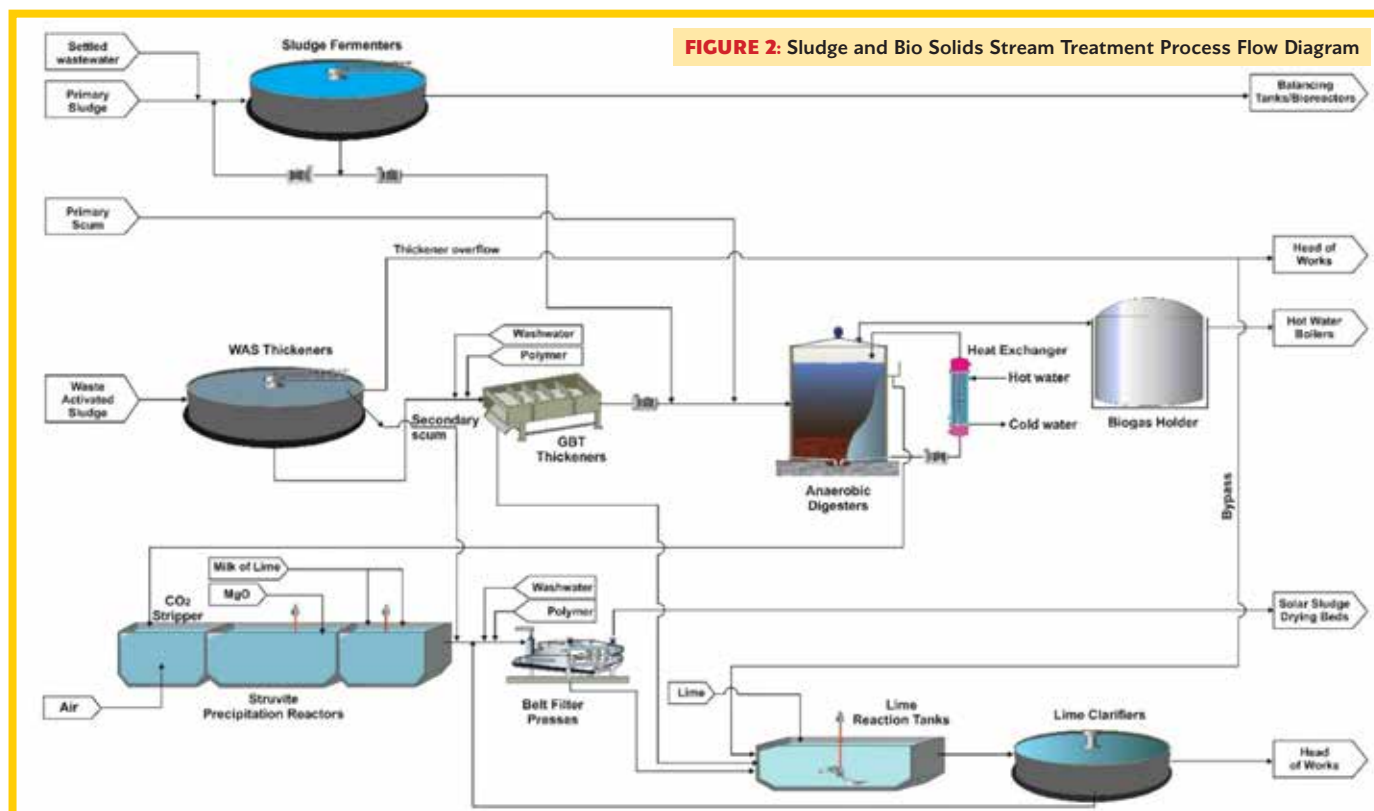


FIGURE 2: Sludge and Bio Solids Stream Treatment Process Flow Diagram

- Command and Control (permits, licences and environmental authorisations).
- Acts that gives effect to sections 32 and 33 of the Constitution, e.g. Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) and Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA) respectively.
- Planning instruments (Catchment Management Plans, Integrated Water Waste Management Plans).
- National Water Resource Strategy 2 (2013). It has the objective to “ensure that national water resources are managed towards achieving South Africa’s growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to 10 years.”
- General duty of care it provides for both the prevention and remediation of water pollution and is imposed on every person who causes, has caused or may cause significant water pollution.
- Strategic framework for water services.
- Norms and standards coupled with water use registrations.
- Receiving water quality objectives general standards and special standards as relevant to discharges.
- Common law provisions (personal, sufficient and direct loss or damage to have been suffered must be demonstrated; direct impact public interest does not qualify).
- Directives, directions and compliance notices.
- *Locus Standi* (Environmental rights in South Africa has been elevated to the level of constitutional protection).
- Economic instruments (Water pricing strategy based on polluter pays principle).

A summary of South African legislation applicable to the management, operation and maintenance of a WwTW is provided in Table 1: South African legislation applicable to the operation and maintenance of municipal WwTWs. Specific legislation governing the protection of the receiving environment such as the National Environmental Management Act (Act 107 of 1998) (NEMA), National Environmental Management: Waste Act (Act 59



FIGURE 3: 3D drawing of conceptual BNRAS WwTW next to a watercourse

of 2008) (NEMWA) and National water Act (Act 36 of 1998) (NWA) require authorisations, permits and licences for any construction and operational activities that may trigger the activities and thresholds specified. In general, WwTWs require an Environmental Authorisation (EA) in terms of the NEMA EIA Regulations (GN R.983 and 984 of 4 December 2014), as amended, and Water Use Licence (WUL) in terms of National Water Act (Act 36 of 1998) (NWA) to legally construct and operate a WwTW.

MUNICIPAL WWTW ORGANISATIONAL STRUCTURE AND LEGAL LIABILITY

The key to a well operated and maintained WwTW is suitably qualified and experienced plant personnel. The operational management of a typical WwTW is generally led by a Works Manager dedicated to wastewater operations, as indicated in the organogram in Figure 4. The Works Manager should be qualified for a Class A Works and manages all aspects of the WwTW operations. The Process Manager and Maintenance Manager represent the second level of management hierarchy. The Process Manager, qualified as a Class V Process Controller, will be directly responsible for the WwTW operations and

TABLE 1: South African legislation applicable to the operation and maintenance of municipal WwTWs

Law	Applicable sections	Duties and responsibilities of managers	Consequences of non-compliance
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution of the Republic of South Africa, 1996 (18 December 1996) provides that “everyone has the right to an environment that is not harmful to their health or well – being, and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures. Section 27 of the Constitution further ensures the right to access to sufficient water.	Section 24 and 27 ensures protection of the environment water for human needs of acceptable quality and quantity. The Constitution therefore impose a duty on all parties that may act in a management or operational capacity at a municipal WwTW to ensure no adverse impacts affect the health and well-being of our natural environment or the people that live in it.	The framework to enforce Section 24 of the Constitution is provided by the National Environmental Management Act (Act 107 of 1998). A person convicted of an offence in terms of the provisions of NEMA may face penalties as severe as a fine not exceeding R10m or imprisonment up to 10 years.
National Environmental Management Act (Act 107 of 1998) (NEMA)	Chapter 1 of NEMA sets out environmental principles designed to guide the actions of persons and all organs of state to prevent significant harm to the environment. Principles applicable to the management and operation include the <i>Polluter Pays principle, Precautionary principle, and the principles of Sustainable Development and Environmental Justice.</i> Section 28(1) NEMA stipulates the responsibilities associated with duty of care and remediation of environmental damage, where responsible persons must take reasonable measures to prevent pollution from occurring, continuing or recurring.	It is therefore the duty of every person or manager performing duties at a municipal WwTW to prevent any pollution from a WwTW, or to take reasonable measures to remedy pollution that has occurred. Section 28(1A), stipulates that not only does the duty defined in Section 28(1) apply to possible or actual pollution, caused by the actual polluter, that may occur or has occurred in the present or future, <u>but also significant environmental pollution and degradation that occurred before the commencement of NEMA.</u>	In terms of NEMA, a natural or juristic person commits an offence if he/she, amongst other, fails to comply with a condition of an Environmental Authorisation (EA) or negligently commits any act, or fail to act on an incident, which causes significant pollution or degradation of the environment or people. A person convicted may face penalties as severe as a fine not exceeding R10m or imprisonment up to 10 years.
National Water Act (Act 36 of 1998) (NWA)	Section 19(1) of the NWA makes provision for the general duty of care and states that an owner of land, a person in control of land or a person who occupies or used the land on which any activity or process is or was undertaken, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.	Section 19 of the NWA legally impose a duty of care on the owner, operator and/or manager of a municipal WwTW to take all reasonable measures to prevent any pollution from occurring, continuing or recurring. This duty becomes further legally binding once a water use, as defined in Section 24 of the NWA, is licenced.	In terms of Section 151 of the NWA, any person who, amongst other provisions, intentionally or negligently causes pollution of a water resources, or fail to perform his designated duties, which includes acting and remedying pollution caused, is guilty of an offence and liable to a fine or imprisonment for up to five years, or both, on first conviction, or a fine or imprisonment up to ten years, or both, on second conviction.
Water Service Act (Act 108 1997) (WSA)	Section 3 of the Water Service Act (Act 108 1997) (WSA) stipulates the right of access to basic water supply and basic sanitation	The WSA works in conjunction NWA to implement its objectives. In terms of Section 6 or 7 of the Act the water service authority must give approval to a person to dispose industrial effluent in any manner approved by the service authority.	Fines and imprisonment in conjunction with Section 151 of the NWA.
National Health Act (Act 63 of 1977) (NHA)	Section 20(1) of the NHA provides that “every local authority shall take all lawful, necessary and reasonably practicable measures to avoid any nuisance, unhygienic condition, or any offensive condition. The local authority must furthermore prevent the pollution of any water intended for the use by its inhabitants, irrespective of whether such water is obtained from sources within or outside its district, or must purify such polluted water.	The NHA impose a duty on local authority, and by extension, responsible managers to take all lawful, necessary and reasonable practicable measures to prevent the pollution of any water intended for the use of the inhabitants.	In terms of Section 57 of this Act any person who contravenes or fails to comply with any provision of this Act, shall be guilty of an offence. These vary from a fine not exceeding R500 or 6 months imprisonment on first conviction up to R1 500 or imprisonment not exceeding 2 years for third conviction.
Local Government: Municipal Structures Act (Act 117 of 1998)	Section 84(1) of the Local Government: Municipal Structures Act (Act 117 of 1998) sets out the division of functions and powers between district and local municipalities. In terms of sections 84(1) a district municipality’s functions and powers include management of domestic wastewater and sewage disposal systems.	There is however a shared responsibility of powers and functions as described in the Structures Act to be exercised between the Local and District Municipality. The municipal manager is <i>inter alia</i> responsible and accountable for all income and expenditure which would be required to implement his/her functional areas.	It appears as if no direct provision for penalties is provided excepting for crosscutting functions with similar municipal acts in which instances the penalties on offences of those specific acts apply.
Local Government: Municipal Systems Act (Act 32 of 2000)	Section 55(1) of the Local Government: Municipal Systems Act (Act 32 of 2000) indicates that the municipal manager as head of administration is, subject to the policy directions of the municipal council, responsible and accountable for provision of services to the local community in a sustainable and equitable manner.	Core services to be provided by municipalities include as the provision of clean drinking water, sanitation, clean drinking water, waste removal et cetera.	In terms of this Act a councillor who attempts to influence the municipal manager or an agent of a municipality not to enforce an obligation in terms of this Act, any other applicable legislation or any by-law is guilty of an offence and on conviction liable to a fine or to imprisonment for up to two years.

will manage all operational staff. Additionally, the Maintenance Manager is directly responsible for all maintenance activities and works of the WwTW. Municipal WwTW are owned and operated by structures of the relevant municipality, therefore liability associated with significant pollution, degradation or loss of life resulting from the municipal WwTW is furthermore transferred to Municipal Manager of the said municipality. Municipal Managers must therefore understand and implement the principles of Duty of Care, Precautionary principle, Polluter pays and Environmental Justice in the day-to-day management of the municipalities they serve.

CONCLUSIONS

South Africa has excelled in the provision of legislation and supporting legal instruments, not to mention the elevation of water quality and quantity to constitutional level and the provision of *locus standi* in both the Constitution and NEMA. It is therefore in our long-term and national interest that such contraventions should be uncovered and corrected. This is a challenge and responsibility that all of us must face and live up to. Considering the duties prescribed for designated responsible entities, offences and associated consequences of non-compliance with the principles and provisions of NEMA and

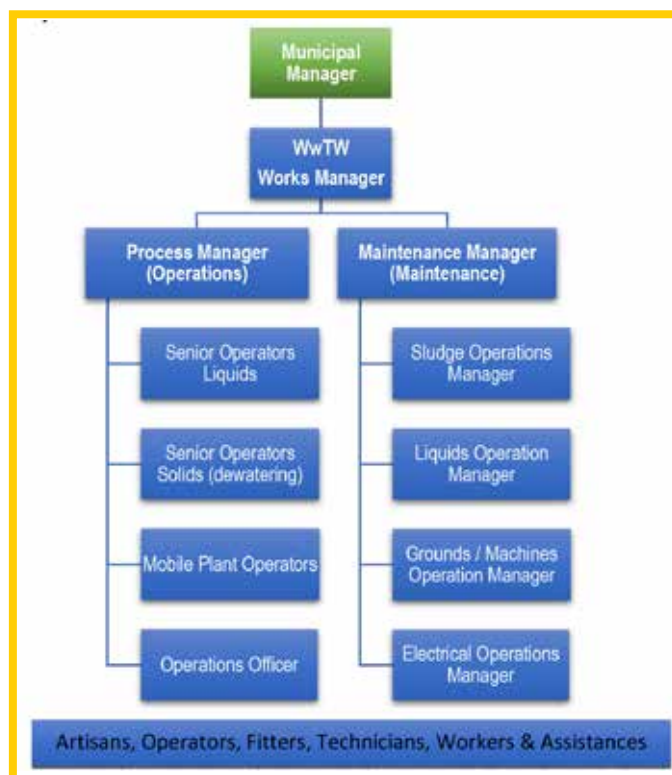


FIGURE 4: Organisational structure for a typical municipal WwTW

the NWA, specifically, it is critical to understand that liability associated with past, potential, existing or future pollution does not end with the juristic person. Consequently, managers and persons in control of a plant, process, activity or action can, and will, be held liable for significant pollution, degradation or loss of life in their personal capacity, which can in extreme cases result in criminal prosecution and possibly imprisonment.

Managers and persons in control of a process or activity associated with the management and operation of a municipal WwTW is therefore urged to make themselves knowledgeable with the environmental legislation applicable to WwTWs in South Africa. Understanding the duties and responsibilities bestowed upon them by the legislation briefly discussed in Table 1: South African legislation applicable to the operation and maintenance of municipal WwTWs, and implementing the environmental principles must become part of day-to-day management of all aspects of a municipal WwTW.

RECOMMENDATIONS

Best practice guidelines and recommendations to assist managers and responsible persons with compliance with environmental legislation in South Africa include:

1. Status Quo assessment of all municipal WwTWs within each municipality in South Africa should be undertaken, if not already done, to identify problematic works, failing infrastructure and equipment, associated environmental risks and maintenance needs. Such WwTWs must be prioritised for improvements.
2. Refurbishment and expansion of existing municipal WwTW often result in a number of acts, regulations and policies being triggered, which may result in the need for an Environmental Authorisation (EA), licence or permit to be obtained from the relevant authority. It is recommended, as a first course of action, for managers of municipal WwTWs to undertake or commission an environmental legal risk assessment. Such an assessment must confirm the status of any existing authorisations, permits or licences; must identify activities or infrastructure in operation that is not licenced; and identify all environmental risks associated with the WwTW in question.

3. The status quo assessment and/or refurbishment and expansion programmes could then be translated into a compliance strategy with well prioritised actions and funding for implementation and also auspices of a specific municipal manager and in consultation with the relevant Competent Authorities.
4. Continuous development and capacitation of managers and responsible persons in integrated environmental management, environmental legislation and implementation of NEMA environmental principles is strongly recommended. This can take the form of formal training, attendance at environmental management workshops and conferences such as the annual International Associated for Impact Assessment South Africa (IAIAsa) conference.
5. The cleaning of infrastructure or equipment, such as the removal of screenings from a works, and management of the resultant waste must be undertaken within the ambit of the relevant environmental legislation, authorisation, permit or licence. It should never be buried on site or stored in an area or within infrastructure not designed for this purpose.
6. A knowledgeable and responsible person must be designated, or employed, within the municipal WwTW and respective municipality to monitor environmental risks and compliance with environmental legislation on a day-to-day basis. This responsible person will therefore also be liable in the event of significant pollution and must therefore act accordingly, or assist in remedying such pollution promptly.
7. Maintenance of municipal WwTWs are critical to reduce the risk of environmental pollution and degradation. The state of WwTWs in a poor state of repair must be properly documented and escalated in priority within the municipal framework.
8. Surface water, groundwater and bio-monitoring, although generally stipulations of a municipal WwTWs authorisation or licence, must be prioritised. Regular monitoring will identify this risk early thus allowing sufficient time to implement management actions.
9. An appropriate emergency response plan that sets out the procedures to deal with spillages and contamination events must be implemented for municipal WwTWs. Such plan should include containment and corrective actions to take in the event of a sewage spill, measurement and monitoring requirements subsequent to the pollution event, and appropriate reporting procedures. Designated WwTW staff must be undergo environmental awareness training and be conversant with the content of the emergency response plan.
10. Employment contracts of all WwTW staff should be performance based and therefore tied to measurable and achievable key performance indicators. This approach provide focus on the service provided by WwTWs and reduce treatment costs by promoting efficient and effective operation.

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