MAP FORUM MEETING

MORELETA / APIES / PIENAARS RIVER SUB-CATCHMENT

Date : **19 JULY 2022 (TUESDAY)**
Time : **10:00 - 12:45**
Venue : **DWS TRAINING CENTRE, ROODEPLAAT**

Chair: **Ms. Erica Bergman**
Scribe: **Mrs. Louise Pretorius**

MAP FORUM

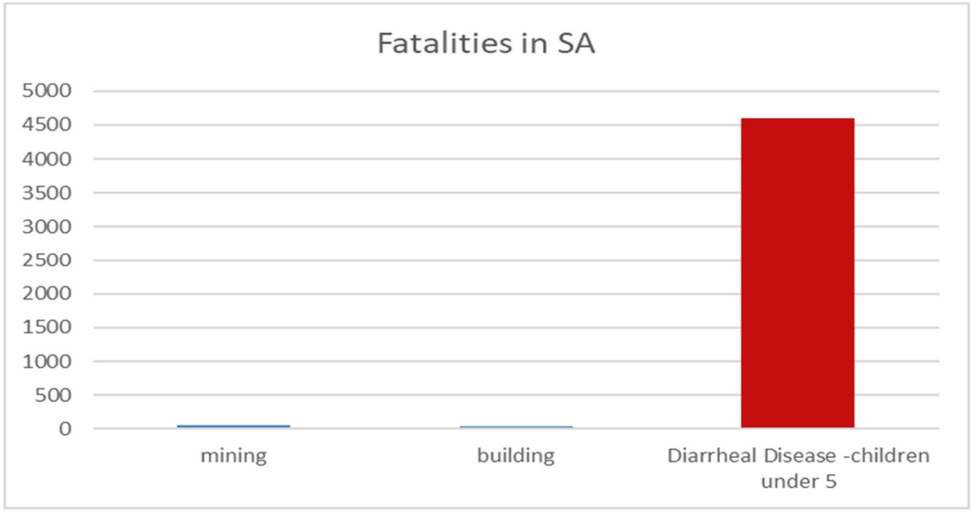
ITEM	ACTIVITY	DESCRIPTION	ACTION
1)	**WELCOME**	The chair Erica Bergman welcomed attendees.	
2)	**ATTENDANCE AND APOLOGIES**	An attendance register was circulated.	
3)	**PREVIOUS MINUTES**	Accepted without change.	
4)	**RATIFICATION OF AGENDA**		
5)	**ITEMS FOR DISCUSSION**		
5.1	**Wastewater Treatment Works and Rooiwal**	It was previously discussed that the Phase 1 contract was in difficulty and Tshwane was struggling with the contractor. Legal processes are currently in process and the outcome is unsure. A decision was taken that a discussion on Rooiwal and Treatment Works would stand over until later, since no new information can be added at this time. It was agreed that the usual feedback on Rooiwal will be omitted.	
	Budget	Erica had a look at the financial statements and presented an overview. Erica reported that DWS' Green Dot Report was issued in April 2022 and that Tshwane spent more on sanitation last year than any of the other councils. While the funds allocated was still not sufficient, it was noted. Tshwane budgeted income for this year of R42 billion. The capital budgets per department were discussed. Erica mentioned that there seems to be a change in the way in which the Finance Department is thinking about spending funds. It seems that the experience for Peter Sutton taking care as the MMC Utilities in the absence of MMC made the Department aware that partial funding makes it impossible to compete a project. It is sometimes better to delay a project until it can be completely funded. MMC Johnston responded that there is definitely a different view on managing finances. He indicated that there is now a first-hand understanding on the ground of what is being done and emphasised that their number one pillar is	

		infrastructure with a commitment to the improvement and development of infrastructure for this term. While the process to get there is not an easy path, the first steps had been taken in this budget. When they move into to the second and third years, in the medium and long term, improvement will become more noticeable. Erica suggested that one of the things to consider is that the city does not ringfence the money for specific projects. Money paid in by Developers for upgrading infrastructure do not go to the agreed upon work but gets mixed into the R42 million budget. Erica suggested that income generated by services agreements be kept separate and used for infrastructure upgrades. MMC Johnston agreed that the funds going into the general account and not being allocated to specific projects, is a problem that should be addressed. Erica pointed out that when services agreements are in place between developers and the Council, it should be possible to allocate a certain amount of funds to specific projects in accordance with those agreements. Stephens Notoane indicated that the MSMA is a problematic roadblock. He cited the City Improvement District in Hatfield as an example where a certain level of ringfencing of funds are possible. He mentioned that they already have their teams looking into it. He indicated that this is something that should have been solved a long time ago and they will hopefully have meetings within the next two weeks to find a way around it.	
5.2	**Solid Waste**	Ntombizodwa Mhlathi from the Division Waste Management in the Department Environmental and Agricultural Management presented on the Waste Management Strategy of the City. She reported that the strategy consists mainly of collection; waste disposal; waste separation, re-use and recycling; and law enforcement. Law enforcement and prevention of illegal dumping is critical since it is something that had been lacking for quite some time. She mentioned that the city is seeing unprecedented levels of illegal dumping and emphasised that waste separation, re-use, recycling, integrating into collections and disposal is something they had been working on very hard. The bylaw review process is underway to incorporate the NWMS prescripts in respect of the waste hierarchy. By-law enforcement is carried out by metro police (amended fines schedule). Zodwa stated that they had run out of space for waste disposal and that disposal should be a last resort. They need to change the way waste is managed by reducing the generation of waste through re-using and recycling as the landfills are “like a mine waiting to explode.” Vandalism and criminal activities are also a serious challenge. Historically the municipality concentrated on removing and dumping, but they are moving towards a paradigm shift. Making changes requires support from infrastructure and actions such as re-educating the public, changing citizen behaviour and resource allocation, which will take time, but they are working on it. Zodwa pointed out that for some activities such as litter pickers, a mix of permanent staff and contracted workers provided by the Expanded Public Works Programme (EPWP) are used. Contracted workers under the EPWP are now wearing green overalls to identify them, as opposed to orange or blue overalls. Johan Botha reported on an investigation that had been done in Barberton to generate electricity from sewerage and waste. The amount of energy they could recover was 4 MW, with a net gain of 3MW. Unfortunately, the project could not continue, but it served to prove that this was a viable option. Zodwa responded that there are other examples	COT

		that they are aware of, stating they are looking into ploughing back into the grid and bringing about stable energy supply. Marc Leroy asked how much is being done to promote turning customers' mindset. Zodwa responded that they are battling to have their IWMT? approved and hoping that it will be done within the next three to six months. Through this programme, intensified education will be rolled out and everybody will be forced to comply with the regulations. Erica asked what could be done to go back to the supply chain of waste and make them responsible? She pointed out that Woolworths, for example, is supplying single-use plastic and that they should recover it and take it back to source to re-use. All the retailers sell food in plastic containers, which should go back empty to their distribution centres for waste recycling. Zodwa replied that they are working on it. As soon as the strategy is finalised, it will go out for public comment. The approach in the past was that some of the big producers such as Coca Cola have supported them. However, its success will depend on people who want to club in. Erica emphasised that Council should take a much firmer stand on waste and should force the big waste producers to cooperate. Erica pointed out that there is a huge informal sorting centre opposite Castle Gate shopping centre in Solomon Mahlangu Drive. All of the stuff they are not using go into rivers, but this process should be stopped. Zodwa responded that reclaimers' sites must be managed in a controlled way, but the reclaimers don't want it. They want to guard their property, so they sleep there and the sites eventually become informal settlements. Mark pointed out that one industrial programme should not become a problem for another industrial programme. Erica concluded with a statement that what we see is not good enough and the City must take a very firm stand on solid waste management. Erica thanked Zodwa for the feedback and requested regular feedback on their progress with their planned initiatives.	
5.3	**Water Quality Management**	Dr Vhahangwele Akinwekomi from Magalies Water presented on Water Quality Management. Vhahangwele provided a summary of the water quality monitoring that they do in the catchment, mentioning that this presentation was a continuation of a discussion from a previous meeting. She reported that over the years they realised that there was a treatability index based on water quality determinants, such as nitrates, phosphates, algal count and turbidity. To get good quality water, it should be around 1, but the turbidity was running to between 50 and 100. They started monitoring the water quality in 2019 to determine what was causing the increasing index. Vhahangwele indicated that in the **Vaalkop catchment** the microbiological and biological contaminants significantly contribute to the deterioration of water quality. Parameters such as E. coli, Total Coliform, Somatic coliphages, Chlorophyll Total, and Fecal Coliforms were above the prescribed limits except for TOC. High level of the identified contaminants denotes that the raw water will require high dosages of disinfectants to bring the water to acceptable limits.	**Magalies Water**

		At **Cullinan**, the sampled levels of ammonia, TOC, and Phosphate were within the acceptable range, but total Algal Counts and Cyanobacteria had excalated levels in the BHS 1, 2, 3, Final effluent 2 and Bronkhorspruit river. The presence of these parameters tampers with the water quality and may lead to taste and odor problems along with the production of DBPs. Escalated levels for manganese were picked up in the outflow from Kusile 2 and improved after the source was identified. Cullinan Raw water index showed a strong increase in treatability index trends at the beginning of 2022, which affects the Wilge River. They identified that pollution was very high from the Bronkhorstspruit wastewater works and received many complaints. The Bronkhorstspruit River had high manganese concentrations. The **Wallmansthal-Klipdrift** Canal treatability trends was way higher than expected since January 2022 (exceeded 200 000). Vhahangwele indicated that elevated levels of E. coli and coliforms were picked up. This may be due to our water sources being contaminated with animal waste, or from our wastewater sources. High levels of chlorophyll were also observed hence denoting that the catchment is drastically contaminated. This may be due to high rainfall, particularly if the rain has flushed nutrients into our water sources, not forgetting again that chlorophyll-a levels are also high during summer months due to temperature and nutrients. Elevated levels were observed for turbidity and cyanobacteria on Zeekoegat WWTW. This confirms that these are contaminants of concern in the catchment. The presence of cyanobacteria can cause cyanotoxins, and also lead to taste and odor problems. The Zeekoegat WWTP and the Roodeplaat dam also comprise a notable level of ammonia, however, this was observed to attenuate with dispersion from the point source. This further explains that furthest points such as Klipdrift will not really suffer from high levels of ammonia. Vhahangwele summarised that enrichment of the catchment with nutrients, particularly ammonia, has been observed to be the main challenge and this leads to a rapid growth of aquatic plants. High algal counts and chlorophyll were also observed in the catchment, hence reaffirming high probability of eutrophication across the investigated catchments. This could potentially be linked to a number of anthropogenic activities such as agriculture, wastewater treatment processes, illegal discharge, mining activities, WWT and waste disposal. She encouraged the Council to optimize their wastewater treatment facilities and process, particularly, the biological nutrient removal (BNR) process where nutrients attenuation takes place. Vhahangwele stated that we need intervention from the municipalities. They need to understand what is coming into and out of the treatment works and catchments, how much it costs to treat the water etc. The question was raised on how Magalies Water distinguishes between the Zeekoegat wastewater plant and the Roodeplaat Dam if there are three river systems entering the Roodeplaat Dam. Erica stated that the problems that they have are to a great extent caused by three main WWTWs in the catchment.	COT

		David Ntsowe asked how the treatability indexes are determined and affected. Vhahangwele responded that they need to look beyond the wastewater treatment. We must understand that the water treatments are not removing heavy metals. We need to determine the industries that create the waste and should be able to implement some form of protection as WWTWs are not designed to remove heavy metals. There is some removal by sludge, but not by design – we need to broaden our scope. Erica commented that the City has a department for pollution control that is supposed to identify sources of pollution. They work with industries, so they are supposed to target those sources. Bylaws should be changed so that the authorities can force those industries to implement plans to deal with heavy metals and other pollutants. David stated that some industries see it as being much cheaper to not comply as the fines are not high enough. We have to look broader and see how we can force them to comply. Erica agreed that this continues to cause problems downstream and requested that enforcement be stepped up. She stated that businesses who run industrial processes should have programmes in place and bylaws must be used to enforce compliance. Terry from the Hennops Catchment Forum reiterates David's remarks. He indicated that flouting the by-laws is cheaper than paying the fines. Regulations should be drawn up and directed at those companies to stop operations or find a solution. It was agreed that this is a problem that must be addressed. We need a method to enforce the water bylaws. The Directors are the Department of Water and Sanitation and the City's Department for Pollution Control must be approached to assist.	All /
5.4	**Phragmafilter System**	Flip Joubert of Blue Crane Wetlands presented on the Phragmafiltre© system. Blue Crane Wetlands partner with a UK company ARM. ARM has 43 years' experience in this field and are considered international experts in this field. ARM undertakes the process design and Blue Crane carries out the design, construction, operation, maintenance and funding. Blue Crane forms part of the technology group Global Wetland Technology, an association of about ten companies worldwide. They are represented on three continents and have collectively designed about 1 400 wetlands throughout the world. Flip reported that we are referring to engineered wetlands, or constructed wetlands, and not natural wetlands to treat wastewater in various applications, including mining, sewage, industrial petrochemical applications. The largest one in the world is in Germany, designed and operated by a German company. Flip reported on the devastating downstream effects of water pollution and 4600 fatalities in children under 5 are caused by diarrhoea.	Flip Joubert, Erica, Bergman



Flip proceeded to explain how engineered wetlands work and how they are constructed. He indicated that there are intricate processes of interaction between media filtering out physical solids, biological matter and interaction with the plants. Raw sewage inflow is treated by processes that include filtration, retention, oxidation and mineralisation to obtain good quality treated water at the outflow. This type of wetland is specifically designed to deal with sludge and the 1st set of beds are loaded intermittently to allow drying out and assist with mineralisation and breakdown of the sludge.

Removal of COD, BOD, Solid suspension and THN of a properly maintained wetland is 94 – 99% effective. Although the initial cost of all water treatment systems is significant, the whole-life cost of engineered wetlands are much lower than traditional treatment plants.

Question: Mark observed that the engineered wetlands were designed for conditions in Europe and referred to nutrients, microbes, movement of the roots etc. He asked whether wetlands will also work efficiently under other conditions.

> Flip responded that the type of vegetation doesn't make a difference as most of the biological processes take place by microbial action in the aggregate bed. The surface area of $1m^3$ of 13mm stone is $400m^2$. Thus, if you run effluent through even $1m^2$ of aggregate, you expose the nutrients in the water to $400m^2$ of biological treatment area. Although many types of plants can be used in the process, the phragmite reeds that they use grow to a root depth of 1 metre, which is the depth of a normal filter bed.

Question: How do the wetlands deal with sludge as this is a major problem in South Africa.

> Flip responded that most wetlands currently used in South Africa don't treat the sludge and that this must be removed periodically. The Phragmifitre system is different in that it is specifically designed to treat

		sludge. The wetland is designed in accordance with the sludge requirements. The sludge breaks down and mineralises and can be used as compost. A wetland will typically work for 15 to 20 years before compost needs to be removed. Maintenance will include the periodic cutting back of reeds, which can be used for compost or animal feed. Once compost is removed, the aggregate is cleaned and reused. A larger surface area is required than for traditional WWTWs. 300 ha will be required to replace Rooiwal WWTW, for instance. The process, however, is much simpler than traditional WWTWs, and thus very suitable for rural areas or where skills are lacking to manage traditional WWTWS. Question: How quickly can wetlands be constructed and operational? Is this as time consuming as installing a traditional WWTW? Flip responded that it only takes a few months to get it operational. It is easy to construct one wetland and scale the system up as more capacity is needed. Question: Is there a limitation on the size of the wetland? Flip responded that the size can be scaled according to what is needed. A stable inflow of water is required. Question: Is an Environmental Impact Study required? Flip replied that it depends on the size of the site. Question: Is it possible to treat water contaminated with heavy metals using engineered wetlands? Flip replied that this is a biological process and that it will not treat heavy metal. Erica mentioned that Beefcor feedlot, which supported 4000 head of cattle at the time it was designed, had a problem with high levels of ammonia. The subsoils contain iron-rich ferricrete. Iron binds with ammonia and can take it out of the system where plants cannot. The type of aggregate is important and can be adjusted according to the type or quality of water that needs to be treated. The media that is used can be adjusted to accommodate petrochemicals and other contaminants. There are ways of dealing with heavy metals. This technology is already used in the mining industry, as well as in commercial applications. Flip agreed that site specific requirements can be accommodated in the design. Question: Do you have to regulate the loading and control the inflow? Can a constructed wetland co-exist with a natural wetland as a secondary treatment? Flip responded that controlled loading is done in the 1st phase of the wetland. The 2nd and 3rd beds are saturated. A constructed wetland can be used to supplement natural wetland processes or pre-treat water before it reaches a natural wetland to filter out unwanted contaminants. However, this will require a sensitive design and coordination with water authorities.	

		Question: How much of the water that goes in, reaches the outflow? Flip responded that there is some uptake of water through the phragmites, but most of the water reaches the outflow and becomes available for reuse. Question: What is happening with wastewater in rural areas? Erica replied that most municipalities don't always have the necessary knowledge or funds to properly treat wastewater and that this is a particular concern in rural areas and smaller municipalities. Question: Can this technology be used to supplement Rooiwal and perhaps deal with the sludge? Erica responded that there are currently about 20 claims against the City regarding pollution from Rooiwal. She stated that if the City can come up with a plan, the farmers will accept it. It was agreed that we urgently and critically must find solutions for wastewater treatment. The City of Ekurhuleni is also looking into using wetlands to treat water. Municipalities have a responsibility to supply water, but also to treat wastewater. It was stated that constraints of the existing pipe systems is sometimes a challenge. Wetlands however, can be decentralised to circumvent this problem. Erica suggested that people visit the recently constructed engineered Phragmafiltre wetland in Midstream Estate. Interested parties can let her know and she will set up a date and a time.	
6)	**DATES OF NEXT MEETINGS**	2022: 20 September 2022, 15 November 2022 2023: 17 January 2023	
7)	**CLOSURE**	Erica declared the meeting closed and thanked the members for their attendance and participation.	